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Mechanical

AUTOMOTIVE INDUSTRIES

LAND — AIR — WATER

NOVEMBER 20, 1937

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20TH CENTURY

17TH CENTURY

★ IRON SEEMETH A SIMPLE METAL
★ BUT IN ITS NATURE ARE MANY
★ MYSTERIES, AND MEN WHO BEND
★ TO THEM THEIR MINDS, SHALL
★ IN ARRIVING DAYS, GATHER
★ THEREFROM GREAT PROFIT
★ NOT TO THEMSELVES ALONE
★ BUT TO ALL MANKIND.

JOSEPH GLANVILL, 1650

CORPORATION

... to all mankind, daily and in many ways, Republic brings profit through its achievements in new and improved alloy, stainless and carbon steels. Soon for all industry, Republic will widen further the doorway to profit by placing in operation the largest, fastest and most modern hot and cold continuous strip mill in the world.

REPUBLIC
STEEL
GENERAL OFFICES
CLEVELAND, OHIO



*"By the way, Jim, get in touch with the
STANDARD LUBRICATION ENGINEER . . .*

**he saved us money on
that last installation"**

Plant alterations or additions and the installation of new equipment require considerable planning and forethought. Building design, equipment layout, production flow are determined before any part of the work is started. Architects, equipment erectors and many other specialists outside your organization are called in for consultation. And in this stage of the operation, that other specialist, the Standard Lubrication Engineer, can be consulted with real advantage to you.

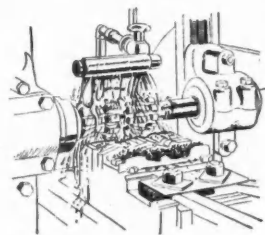
In most instances the changes involve problems in lubrication. Additional units will increase power demands. Increased production in one

department may throw an added burden on existing equipment in another. From the power plant to the furthestmost line shaft or motor, lubrication should be checked and lubricants stocked to handle the new conditions.

Start right. Plan for lubrication as you plan other plant changes. Call an expert on lubrication—the Standard Lubrication Engineer. Let him study your problem before operations begin.

Start now by getting acquainted with your Standard Lubrication Engineer. Call him at your local Standard Oil office. You'll find his service willing, helpful and free.

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A Standard Lubrication Engineer will be glad to help determine the correct emulsion on any of your metal cutting or grinding jobs.

**THE RIGHT
LUBRICANT
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PROPERLY
APPLIED
•
TO REDUCE
COSTS**

**STANDARD OIL COMPANY (INDIANA)
LUBRICATION ENGINEERING**

AUTOMOTIVE INDUSTRIES

AUTOMOBILE

Reg. U. S. Pat. Off.
Published Weekly

Volume 77

Number 21

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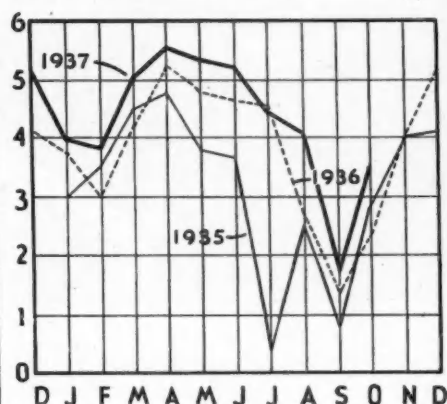
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AUTOMOTIVE PRODUCTION*

Passenger Cars and Trucks —U.S. and Canada

Bar charts at the right repre-
sent total production to Nov.
1st of year indicated.

Numbers at left of monthly
graph below show production
in 100,000's.



*From Department of Commerce Report
and Automobile Manufacturers' Ass'n.

Ideas in Zinc

Automotive engineers are proverbially the first to take advantage of new developments in materials and production methods. Among the first to recognize the advantages of pressure cast modern zinc alloys, the industry has steadily increased their use until today we find achievements typified by the attractive 1938 Dodge.

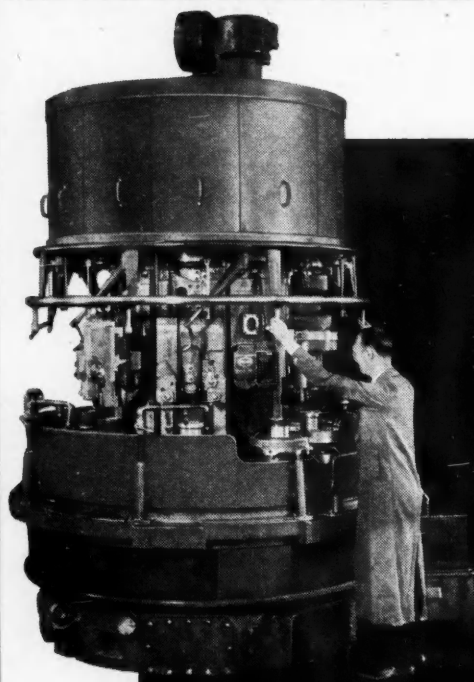
This car will carry a total of 76 zinc alloy die castings on most of its popular models—die castings that will act in a utilitarian capacity beneath the hood as well as to perform the more publicized function of carrying out design motifs in a manner which sells automobiles. The utilitarian parts include the fuel pump, carburetor, pivot bearings, air horns, speedometer frame, and various lock mechanisms. The die cast structural and design applications start with the new two-piece radiator grille, and carry back throughout the entire car to the smart looking die cast tail lamps. The new Dodge depicts the current vogue of front end styling. In addition to the new grille, other zinc alloy die castings on the front of this car include the pair of hood louvers, a radiator ornament and centre moulding, grille medallion and emblems, crank hole cover—a total of 31½ pounds of zinc alloy on the front end alone!

This collection of die castings on a single popular priced car is typical of the usage to be found throughout the entire industry. The test of time has proved the worth of the die cast type of part and has paved the way to an even greater use of the high strength, stable Zamak Alloys based on Horse Head Special Zinc of 99.99+ per cent purity, in 1939. The New Jersey Zinc Company, 160 Front Street, New York City.

Idea No. 6

See advertisement page 42

November 20, 1937



PROFITABLE LOGIC

Select

MULT-AU-MATICS

for Improved Profits

1. Fast multiple operations. A finished piece in the time of the longest operation plus a few seconds for index.
2. Maintained Accuracy assured on finished work for long periods of production eliminates large volume of rejects, eliminates frequent shutting down of machine for resetting or alignment of tools, and eliminates expensive inspection methods.
3. Design and construction provide versatility in tool change-over from one class of work to another at minimum expense.
4. If others can Profit with these machines, so can You.

Let Bullard Engineering Service prove the Profitable Logic of using Mult-Au-Matics either on your long runs or the comparatively short runs . . . **TODAY** . . . Save Time . . . Send Bullard your prints or samples for Estimates . . . **TO-MORROW** . . . Save Money via The Mult-Au-Matic Method.

THE BULLARD COMPANY

BRIDGEPORT · CONN



Most Dealers Already Stocked

Plants Begin to Feel Effects of Short Changeover and Sales Slackness; Industry Watches Washington for Cue

Already the automobile industry has begun to feel the effects of this year's quick changeover period—four weeks compared with last year's six. Dealers throughout the country, with the exception of Ford outlets, are amply stocked with new models, whereas during the first two weeks in November last year, there was a wild scramble for driveaways and shipments.

However brightening the hinterland shows have been, a good many sales chiefs are now revising their earlier roseate estimates of 1938 output in view of fewer actual closings than they had hoped. Show sales appear to be following the pattern set last month—relatively strong in the upper price brackets. With Ford production far under normal, parts makers and suppliers are not in a cheering mood.

Optimistic estimates of November and December schedules are going through a paring process. In spite of brilliant showings of Hudson-Terraplane and Graham among the independents, and Buick in the GM family, there is plenty of sales resistance. Almost everything from the lack of dramatic differences between the 1938 and 1937 models to the recently observed sunspots has been blamed by curbstone "economists" for the lack of record-making enthusiasm for new cars. Several sales managers read with many misgivings the news stories of the filibuster which prevented Congress from actually getting started on a program. Tax relief for the "small business man" would be as manna from heaven, they believe, holding that such a measure would spur recovery if enacted quickly.

As it is, used car sales in some quarters are lagging also.

With dealers supplied, however, union leaders who either instigate or permit wildcat strikes are not doing the harm to the industry they would if there was a vigorous demand for new cars. Factory managers have closed plants with surprising alacrity on several recent occasions when assembly was halted by sitdowns. The rank and file is getting a little practical education in the supply and demand principle of economics in the meanwhile, and may reach some con-

clusions in respect to the obligations of one group of workers to other groups in the same plant.

—L. P.

Willys Overland Motors, Inc., has approximately 2500 men at work and is making 200 cars a day on four-day week basis. David R. Wilson, president, said indications point to betterment in schedules in the next few weeks.

Libbey-Owens-Ford Glass Co. plans to shut down its laminated plant at Toledo for three weeks beginning Nov. 22. Other units will continue to operate on present schedules. Large stocks of safety glass are on hand for customers and orders for shipment have been restricted in recent weeks. Shutdown was considered preferable to shortened hours or restricted shift operations.

November Sales Gain

*Totals for First 10 Days
Top 1936 Period*

First sales reports of several automobile manufacturers for the opening 10-day period in November, including quite generally sales of 1938 cars all over the country since all new cars were announced and on display by Nov. 1, showed gains over the like period of 1936. The comparison is still

(Turn to page 736, please)



VICTOR W. KLIESRATH

... appointed general manager of The Bendix Products Corp. by Vincent Bendix, president and general manager of the Bendix Aviation Corp., parent company. Mr. Kliesrath came to Bendix when Bendix acquired the Bragg-Kliesrath Corp., manufacturers of vacuum power brakes and other devices. His advancement in the organization had been steady. He is also vice-president and a director of the parent company.

Plants Again Hit by Sitdowns

*Pontiac Closed Until Nov. 22 by Fisher Body Troubles;
Hudson and Cadillac Reopen After Strikes*

Charges by United Automobile Workers members of violation of seniority rules, objections to the discharge of workers as car production has eased, to the speed of production and to the length of the working week, were the expressed reasons for several sitdown strikes and walkouts in the Detroit area during the past week. Four large plants have been involved, two of them several times. A sympathy strike at another plant was averted, it was reported by an appeal by Homer Martin, UAW head.

Meanwhile, UAW plans for its drive on the Ford Motor Co. are said by union sources to be ripening, and the union announced that the resignations of three officers of the Independent Association of Chrysler Employees

were the result of the decision of the men that the Chrysler organization was a "thinly-disguised company union." The company issued a sharp retort.

Closed by a strike on Monday, Nov. 15, opened Tuesday, and closed again shortly after 3:30 p.m. Wednesday, the Fisher Body plant in Pontiac, Mich., has forced the shutdown of the Pontiac Motor plant until next Monday, officials said. It is estimated by Fisher officials that Wednesday's strike, affecting about 7500 workers, was caused by a sitdown of 75 men.

The trouble began when E. R. Leeder, Fisher plant manager, dismissed four instigators of Monday's strike. Leeder announced that the sit-

(Turn to page 732, please)

"The Typical U. S. Motorist"



American Petroleum Industries Committee

Stutz Plan Presented

An amended reorganization plan for the Stutz Motor Car Co. of America is in the hands of creditors and stockholders for approval. Approval has been forecast as the previous plan was backed by all creditors except the Reconstruction Finance Corporation. The new plan provides for extension of the RFC mortgage to July 1. The sum involved in this mortgage is \$266,000.

The plan provides that beneficial certificates will be issued to creditors with distribution of cash balances at intervals. Administration of the reorganized company will be in the hands of Homer H. Davidson, president of the Automotive Credit Service, Inc., Detroit; Charles S. Thomas, Indianapolis Association of Credit Men's Service, and A. B. Cronk, trustees for the property appointed by Robert C. Baltzell, judge of the federal district court here. This group can dispose of the company's holdings by lease, sale or operation at direction of a majority of the creditors and stockholders.

Lease of a large part of the properties to a new organization which will acquire manufacturing rights to the

Pak-Age car, light delivery truck, and which will continue the manufacture of these cars, is forecast to follow approval of the new reorganization plan by the creditors, stockholders and the federal district judge.

Hits Truck Law "Maze"

R. F. Black Suggests Conference of Interested Groups

The trucking industry is hampered by conflicting legislation and penalizing taxes, stated Robert F. Black, president of The White Motor Co., addressing the American Trucking Association's annual convention at Louisville, Kentucky, Nov. 15. He made a direct plea for public understanding and a program of constructive, intelligent legislation to replace the maze of regulatory measures now confronting the motor transportation industry. Mr. Black was the first truck manufacturer to address a meeting of the association.

To abolish all the confusion resulting from conflicting size and weight regulations among the varied states, he suggested a three-cornered meeting be-

tween truck operators, public officials, and manufacturers to determine just what is considered a fair size and weight for a truck.

Black urged elimination of "the scrambled variety of so-called safety laws" enacted by the various states. He called for sane and uniform safety laws that do not contradict themselves every time a truck crosses a state line, and which constitute an intelligent approach to the requirements of braking, lighting, etc. The industry itself was urged to further the interests of highway safety—discourage the practice of overloading, promote careful service and maintenance, properly space trucks on the highways.

Referring to current court injunction proceedings in the matter of conflicting size and weight regulations, Black asserted that the procedure was costly and could not be relied upon to completely clear the air.

"The need is not for law suits, but for standardization among the states with intelligent reciprocity where standardization cannot be effected," he said.

"Trucks represent about 14 per cent of all motor vehicles, yet they are paying nearly 27 per cent of all motor vehicle taxes. Not counting the taxes paid on personal property, income tax and property taxes on garages, terminals, repair shops, etc., the motor transport industry in 1936 paid as so-called 'special truck taxes' the sum of \$383,563,000. This was at the rate of \$95.60 for every truck registered, and nearly double the \$51.80 average per truck for taxes ten years ago."

Quebec Hits CIO, Closed Shop

Implication that within the meaning of the Act Respecting Workmen's Wages it is within the jurisdiction of the Attorney-General's department to declare which trades unions are "bona fide" and which are not, Premier Duplessis of Quebec told a delegation of international union members that affiliates of the Committee for Industrial Organization would not receive that sanction. Without this recognition, unions affiliated with CIO could not claim rights or privileges extended to other groups in the Province of Quebec, the Premier said. The question arose when Lucien Rodier, counsel for the international unions, alleged an abuse of the act with respect to discrimination against men for union activity.

The Premier also made it clear that the Government is steadfast in its attitude against the closed shop. Men have the right to join unions of their choice, and also have the right not to join trade unions, he said.

Mexico Adds to Roads

The Mexican government is arranging to increase by 6,000,000 pesos (approximately \$1,800,000) its investment in automobile roads. The additional outlay is to be forthcoming from an issue of bonds, guaranteed by various government sources of income. Most of the additional outlay will be spent in completing the highway between Mexico City and Guadalajara, a route of 378 miles.

Tire Producers Cutting Output

Report Little Chance of Rise Until After Jan. 1; Inventories Large; Original and Replacement Sales Off

With 1938 automobile production schedules being revised downward, tire inventories still excessive and replacement sales disappointingly low, major tire manufacturers continue to trim their own production schedules, particularly in the Akron area. Tire departments in some Akron plants are operating only two days per week and there appears little likelihood of any step-up in this schedule until after the first of the year. If anything, working forces in some factories may be further reduced and there are reports that at least one major manufacturer may shortly return to the eight hour shift.

Manufacturers are now busy working on their usual spring-dating orders. The industry's spring dating program customarily "freezes" tire prices for six months, giving the dealer a six months' protection against price decline. This means that levels resulting from the Nov. 1 price advances will hold until at least May 15.

Manufacturers are eagerly awaiting the scheduled Nov. 30 meeting in London of the British Rubber Regulations Committee, hoping that the committee will reduce by at least 10 per cent for the first quarter of 1938 the current 90 per cent exportable rubber allowance. Such action, it is believed, would strengthen crude rubber quotations which are now around 15 cents a pound. An 18-cent level is generally regarded as a fair price.

Indications point to a total 1937 tire market for only about 53,000,000 casings—considerably below earlier estimates. The replacement market total probably will not exceed the 1936 figure of 29,800,000. Original equipment deliveries for the year will be under 23,000,000. Manufacturers' inventories still are in excess of 11,000,000 casings. The outlook for 1938 is for a replacement market of at least 31,000,000 units, with varied estimates as to the primary market. It is almost certain, however, that the original equipment sales for 1938 will not reach the 1937 figure by at least 1,000,000 tire units.

Continuing their campaign to standardize tire guarantee practices of all manufacturers, dealers and private brand distributors, and to win ultimate complete discard of the road hazard guarantee, leading tire manufacturers have adopted a new form of standard Life-time Tire Guarantee to their dealers for universal use. The new guarantee guarantees tires to be free from defects in workmanship and material for their life, without respect to time or mileage, and also contains new adjustment clauses.

The new guarantee reads:

"Every tire of our manufacture bearing our name and serial number is guaranteed by us to be free from defects in workmanship and material without limit as to time or mileage and

to give satisfactory service under normal operating conditions. If our examination shows that any tire has failed under the terms of this guarantee, we will either repair the tire or make an allowance on the purchase of a new tire."

So far companies adopting the new guarantee include United States Rubber Company and its affiliated lines; the B. F. Goodrich Company and its

(Turn to page 739, please)

Some Car Materials Dip

Steel, Iron Firm But Other Classes Fall Sharply

Substantial declines took place in the prices of some of the materials going into an automobile between July and November of this year. Prices for wool, rubber, copper, lead and zinc showed declines from July levels ranging from 11 to 22 per cent, but the three major classes of iron and steel, sheet steel, forging steel and cast iron, showed no changes during the summer period. These latter on Nov. 4 ranged from 17 to 22 per cent above the averages for 1936 and accounted in part for the higher car prices announced about Nov. 1. In every case except for wool and rubber, Nov. 4 prices were well above the 1936 averages despite the declines since July of this year.

In addition to these indications of the cost of car production, an index of automotive raw materials on a price-per-pound basis, weighted by relative amounts in a low priced car shows that, against 1929 averages as 100, the high for 1937 was 94.0 on April 1 and the low 85.8 on Nov. 4. The October, 1936, figure was 79.5.

Would Rate Ocean Planes as "Vessels"

The United States Maritime Commission has officially recognized the position of trans-oceanic aircraft both now and in the future in its report to Congress by Joseph P. Kennedy, chairman, who recommends that the Merchant Marine Act of 1936 be amended to include ocean-going aircraft as "vessels."

Outlining the plans now on drafting boards for larger flying boats, the report said it felt that the cost of trans-oceanic air transport will be cut in half in ten years and remarked that a fleet of 18 flying boats on a daily service of three planes daily would offer the same total passenger capacity a year as a super-liner. The cost of the flying boats would be about \$18,000,000 against an American production cost for the liner of \$50,000,000. It was suggested that the problem of high first cost of the flying boats might be solved by enabling the Maritime Commission to extend credits to private companies at a low rate of interest for construction purposes, or, if this method proved unsatisfactory, to build aircraft itself and charter them for operation. Profitable transatlantic operation, at least, was forecast.

Last September, when it became apparent that car prices would rise again, following the increases announced in August on 1937 models, calculations showed (see AUTOMOTIVE INDUSTRIES, issue of Sept. 18) that various materials had risen from 11 to 45 per cent over average 1936 prices and that July prices were higher than the prices on Jan. 1, 1937.

The price increases on cars did not cover the higher cost of materials and labor. Payrolls have gone up far more than can be accounted for by increases

(Turn to page 739, please)



MAJOR R. W. SCHROEDER, until his recent resignation the assistant director, U. S. Bureau of Air Commerce, has been elected vice-president of United Air Lines, in charge of operations.

HARRY M. WHITTAKER formerly chief engineer with Micromatic Hone Corp., has been appointed vice-president and director of sales of Micromatic including the newly acquired Hutto Machine division. Recently Micromatic jointly with the Barnes Drill Co. bought the Hutto Machine division from the Carborundum Co.

J. E. KLINE, formerly chief engineer of the Hutto division, became chief engineer in the combined organization.

A. J. PRENTICE becomes secretary-treasurer.

A. BLEASDALE becomes factory manager. **L. S. MARTZ** becomes advertising and sales promotion manager.

N. H. HUBBARD has been appointed sales manager of the tool division, **E. L. GRUENBERG** is sales manager of the equipment division.

H. L. HARWELL is sales manager of the abrasive division.

J. W. KINSEY is sales manager of the export division, and

L. D. CURTIS is purchasing agent. Divisional sales engineering representatives are

FRANK J. JESCHKE,

G. M. CALVERT,

E. F. BROWER,

DON S. CONNOR,

B. L. MATTHEW,

E. HARTZELL, and

R. MARAH. Directors of the corporation are:

K. W. CONNOR, president,

HUBERT E. HARTMAN,

HERBERT J. WOODALL, and **MR. PRENTICE** and **MR. BLEASDALE**.

(Turn to next page, please)

Plants Again Hit by Sitdowns

(Continued from page 729)

down Monday was unauthorized, and this was confirmed by union leaders who said they did not know of the plans for striking until after the sit-down had begun. Pontiac, which is supplied with bodies from the Fisher plant, employs about 10,000 men.

Basis of the Fisher Body closures was outlined by E. R. Leeder, plant manager, who issued the following statement on Nov. 16:

"At the beginning of production of 1938 models our schedules at that time did not call for as many jobs as were built during the past year. Also the LaSalle body which was built here in Pontiac for the past two years was moved to another plant. It was therefore necessary to bring in fewer men than we had on the payroll at the time the plant shut down at the end of 1937 model.

"Still further reduction in schedules made it necessary to lay off 450 additional men about Nov. 1. It was also necessary to reduce the work week to 28 hours for these remaining on the payroll.

"At a meeting held between the United Automobile Workers and the management on Wednesday, Nov. 10, the bargaining committee demanded that all those people who were on the payroll as of Nov. 1 be returned to work immediately and the work week reduced to between 15 and 18 hours per week in order to absorb them. Numerous protests were received from employees in the plant regarding this plan and the management felt that we were not justified in creating any further hardships by still reducing the work week at this time.

"The committee's action in not appealing the case and calling the strike without following the grievance procedure is a violation of the union agreement. The management up to the present time have not been notified of the reasons why the strike was called or have any demands been made for a settlement."

The Hudson Motor Car Co. plant at Detroit has been closed three times in two weeks. Its troubles were apparently ended Nov. 15 with the aid of James F. Dewey, conciliator for the Department of Labor, who made a hurried trip to Detroit from Washington. The closures were said to have been the result of minor troubles, mostly traceable to seniority rules, involving the layoff of men as output was slowed.

Another of the major plants affected in the past few days was Plant No. 2 of the Bohn Aluminum & Brass Corp. where 600 employees returned to work Nov. 11 after a one-day strike called when the workers charged that the company had taken on five new men after discharging 20 veterans.

About 4000 Cadillac-LaSalle men were affected by a shutdown Nov. 17,

when 75 workers in the foundry went on a sitdown strike early in the day, charging that the management had failed to negotiate wage increases for them. A part of the night shift resumed work, and workers were reported by the company back at work Nov. 18. Nicholas Dreystadt, general manager, began meetings Nov. 18 with union representatives to negotiate the 10 cents an hour wage increase and equalization of pay schedules.

Developments in the Ford drive of the UAW included the approval of plans for it submitted to a conference of over 70 delegates and representatives of Ford locals from various parts of the country. The conference was held in Detroit, Nov. 13. Plans were drafted and submitted by Richard T. Frankenstein, assistant president of the UAW. He said then that John L. Lewis, chairman of the CIO, had promised "all the help you need" to the UAW in its drive.

An advisory committee representing the CIO has been named to sponsor the Ford drive. Its members are Lewis, Philip Murray, chairman of the Steel Workers Organizing Committee; John Brophy, CIO director; Adolph Germer, regional CIO director; Homer Martin, president of the UAW; David Dubinsky, president of the International Ladies Garment Workers Union; Zygmund Dobrzynski, Detroit regional director of Ford organization; two members of the International Union, UAW (to be named later), and Frankenstein.

The drive will include field organization, educational work among foreign-language-speaking Ford employees, colored and minority group organization, and public relations work. Six Detroit district offices were set up, located at Hamtramck, Highland Park, West Side, East Side and Michigan Avenue near Dearborn. Frankenstein said he

has 30 organizers engaged in a house-to-house canvass of Ford employees.

Frankenstein wrote Ford officials and the chief of the Dearborn police, thanking them for not having interfered with the distribution on Nov. 17 of the "Ford Edition," UAW publication, at the gates of the Rouge plant. He wrote Harry Bennett, Ford service organization head, as follows:

"It was a pleasant surprise to us yesterday to find no service men attacking members of our union who were distributing copies of the Ford Edition of *The United Automobile Worker* at the River Rouge plant yesterday. On the contrary, we found your service men very courteous in their attitude toward our organizers and members.

"You will be glad to know that practically every worker offered a paper was glad to receive one.

"We look forward to the early organization of the Ford Motor Co. with the least friction and hopefully, with your co-operation, for the best interests of all concerned."

The incident of the resignations of officers from the Chrysler association brought from the company a statement that charges of the company efforts to reduce wages, lengthen hours and speed up work are "propaganda" and that charges the company supports the association are "False." The three who resigned were Ernest Lo Breque, vice president, Philip Di Falco, financial secretary, and Michael L. Beck, national organizer.

The Society of Tool & Die Craftsmen won elections at the plants of the White & Koninen Co., and the Automotive Stamping and Mfg. Co., both of Detroit, according to an announcement by J. J. Griffin, president of the society.

Labor Wants Partnership

A clue to the objectives of the union movement was given by Homer Martin, president of the United Automobile Workers, when he told a meeting of the



MEN OF THE INDUSTRY

(Continued from preceding page)

FRANK FOOTE, JR., has returned to the Hastings Mfg. Co. as advertising manager. Since his former connection in the same capacity, he has maintained contact with the piston ring field through creative advertising and merchandising activity with a printer and advertising agency. His present responsibility will be in close association with the Hal M. Kreeing agency, Indianapolis, which services the Hastings account.

SIR MALCOLM CAMPBELL, British racing driver, has been awarded the Medal of Honor by the International Motor Yacht Union for his record-breaking achievements with "Bluebird," his racing boat, at Locarno this year.

GEORGE W. MILLER, vice-president of American Lubricants, Inc., of Buffalo, has been elected president of the National Lubricating Grease Institute for the coming year. Mr. Miller is in charge of technical

development for the American Lubricants firm.

C. P. SIMPSON, general sales manager of Pontiac Motors, and

D. U. BATHRICK and

V. L. MURRAY, assistants in charge respectively of the eastern and western halves of the United States, are now traveling through various sections of the country on a field survey.

R. F. HERR, formerly assistant export manager, Harnischfeger Corp., Milwaukee, has been advanced to export manager to succeed Frederick Salditt, recently elected vice-president in charge of sales.

B. E. SIBLEY, chief technologist, Continental Oil Co., has been named a member of the new American Petroleum Institute committee on motor fuels. Mr. Sibley has just been nominated for an SAE vice-presidency for the coming year.

A. T. BROWN has been elected executive vice-president of the Caterpillar Tractor Co., to succeed

C. PARKER HOLT who has returned to the company's office at San Leandro, Calif. **L. B. NEUMILLER**, formerly director of industrial relations, and

D. G. SHERWIN, formerly treasurer, have been elected vice-presidents.

Economic Club at Detroit Nov. 15 that labor wants a share in the control of industry where labor's interests are affected.

Martin denied that labor wants to displace management and ownership, but indicated that labor feels it has a right to its say. He deprecated the use of force in achieving this end.

The UAW head pictured labor as the greatest buffer in a democracy against dictatorship and said that under the circumstances of failure of industry and business by themselves to solve the economic problems of the country, labor, organized and recognized, educated and cooperating, wants to help the Government find the solutions.

Martin remarked that only a third of the monthly American payroll is being met by private capital, the rest coming from Government sources, and asked who would supply the balance when the Federal budget is balanced and relief ended.

GM Firm with UAW

Union Rejects Agreement, May Move for Elections

General Motors Corp., having received notice that the modified agreement negotiated by it and representatives of the United Automobile Workers, was turned down by UAW plant delegates in Detroit Nov. 14, has taken the position that union assurances against wildcat strikes must remain in force and be reacknowledged before any further negotiations can take place. The union plans to move for NLRB elections in the hope of winning sole bargaining rights, still denied by the company.

In a statement by William S. Knudsen, president of GM, the corporation said it understood that the terms of the agreement were acceptable to officials of the UAW possibly excepting the provision prohibiting collecting dues on the company's property. The agreement was unanimously turned down by delegates from 60 GM plants. The company's statement said it may be technically true that the status of the matter reverts to the June 11 basis, date on which the agreement which ended the strike last Spring came up for revision.

Mr. Knudsen added that the company expects that negotiators for the union be given reasonable authority so that major negotiations do not have to be on a continuous basis throughout the year. "Grievances," he said, "can be handled through the regular procedure, but changes in the basic agreement should stand for a reasonable period before new changes are asked."

Operating experience since September has shown improvement, but "is far from what it should be, and real cooperation from union officials will be needed during the coming winter if the results to the employees of the corpo-

PORTABLE

office developed by the Covered Wagon Co. It does not look like a trailer but is mounted on a trailer chassis and can be used wherever field operations make temporary headquarters necessary. The unit comes either 14 ft. or 20 ft. long. Exterior is painted in a sand stucco finish. Skirting covers the wheels.



ration are going to be satisfactory," declared Mr. Knudsen.

Rejection of the agreement by the union plant delegates was based on the refusal of GM to grant it sole bargaining rights, decision by the company to establish the working week at 40 hours instead of the 35-hour week the union demanded, rejection of a 10-cent an hour wage increase, vacations with pay, and retention by the company of the present system of shop committees for handling grievances instead of granting a shop steward system as asked by the union. The company also insisted that local wage payment plans be handled locally, and other than to state that discussions on the speed of operations would be handled locally, did not act to set up wage studies with the object of paying the same wage for the same operation in different localities. The agreement as proposed to the plant delegates contains provisions against outlaw strikes or slowing of work.

Plant Health Costs

GM Spends \$5,000,000 This Year To Protect Workers

General Motors Corp. and its operating divisions throughout the United States and Canada will have spent more than \$5,000,000 during 1937 to protect the health of more than 210,000 factory workers on their jobs, Dr. C. D. Selby, medical director announced.

This figure includes capital and expense items for medical equipment and hospital facilities, salaries, supplies, physical examinations and surveys to safeguard employees from occupational diseases. A large part of the sum has already been spent to control dust and fumes in shops and foundries by means of air conditioning and forced ventilation, of which the operation and maintenance alone runs into thousands of dollars annually.

"From this industrial hygiene program, which has been going on steadily for a number of years, it is reasonable to expect the ultimate absolute control of occupational diseases as well as a marked reduction in all employee sickness of non-occupational origin, thereby contributing to the general com-

munity health of the cities in which we operate," said Dr. Selby.

"The proper placing of men on jobs is also an important development of industrial medicine. Some men are susceptible to skin irritation from handling oil, lead, nickel or other products. physical examinations are given workers frequently in these operations. If a tendency toward susceptibility appears, the man is placed at other work. Constant checks are made on atmospheric conditions in plants, so that those which might cause respiratory diseases are kept under rigid control," he added.

Boat Show Enlarged

With 145 exhibitors under contract, 20 more than were signed at this time last year, space sales for the 1938 National Motor Boat Show in New York, Jan. 7 to 15, already are 10 per cent greater than the total area used for the 1937 exposition, Ira Hand, secretary of the National Association of Engine and Boat Manufacturers, announced.

The space increase will tax the capacity of the three main floors of Grand Central Palace, where the annual show is held, and may necessitate the use of the fourth floor.

An increased number of boat exhibitors is presenting a difficult problem for the show committee, Hand said. "The main floor is over-applied for by several thousand square feet, but by curtailing some of the larger exhibits and by diverting the smaller craft to the mezzanine, we hope to find room for all of the boats," he added.

Chicago Show Drew 322,000

Revised figures on Chicago automobile show attendance place the total for the show at 322,000, a gain of 4000 over last year's all-time peak, and 30,000 ahead of the 1935 record.

New Kudner Appointments

Electro-Motive Corp. of LaGrange, Ill., and Winton Engine Corp. of Cleveland, both subsidiaries of General Motors Corp., announced the retention of Arthur Kudner, Inc., of New York, as advertising counsel. The announcement was made in Detroit by Volney B. Fowler, in charge of public relations and advertising for the two corporations.

Business in Brief

Written by the Guaranty Trust Co., New York

No Signs of Recovery

The decline in general business activity continued last week, and some major industries show no signs of an immediate improvement. Department store sales in the first few days of this month were above those last year, but it is not believed that this increase will be maintained during the entire month.

Railway freight loadings during the week ended November 6 totaled 732,135 cars, which marks a decline of 39,510 cars below those in the preceding week, a reduction of 27,470 cars below those a year ago, but a rise of 77,198 cars above those two years ago.

Construction contracts awarded in 37 eastern states during October, according to the F. W. Dodge Corporation, were maintained at the relatively high level of the few months preceding. The total amounted to \$202,080,900, which compares with \$225,767,900 for the corresponding period last year.

Production of electricity by the electric light and power industry in the United States during the week ended November 6 was 1.2 per cent above that in the corresponding period last year.

According to the Board of Governors of the Federal Reserve System, department store sales last month were in about the same volume as in September. During this year changes in sales have been

almost entirely seasonal, and consequently the Board's adjusted index has varied very little.

Farm Prices Dip

Prices of farm products continued to decline during the thirty days ended October 15. The index for October compiled by the Department of Agriculture stood at 112, based on the 1910-14 average as 100, as compared with 118 for the preceding month.

Retail costs of food during the month ended October 12 declined 1.1 per cent, according to the Department of Labor. The decline was general throughout the country. However, the current index shows a gain of 2.5 per cent above that a year ago.

Professor Fisher's index of wholesale commodity prices for the week ended November 13 stood at 87.1, as compared with 87.9 the week before and 88.1 two weeks before.

The consolidated statement of the Federal Reserve banks for the week ended November 10 showed a decline of \$3,000,000 in holdings of discounted bills. Holdings of Government securities increased \$11,000,000, and bills bought in the open market remained unchanged. Money in circulation declined \$1,000,000, and the monetary gold stock was reduced by \$15,000,000.

Straits tin had been sold at the equivalent of 39 cents, c.i.f. New York, the lowest price in more than four years. Improved securities markets and a somewhat more optimistic view of the European political situation served as explanation for the sharp recovery, but underneath it was not difficult to detect foreign interests once again discovering that Americans always buy in a rising market, but invariably turn their backs on a drooping one.

Europeans, on the other hand, appear to have taken full advantage of recent low copper prices, although they continued to buy moderately after export prices turned slightly higher. A fair demand for shipment abroad was reported at this week's opening export price of 10.55 cents, c.i.f. Liverpool. At the same time custom smelters did a large business at 11 cents, whereupon speculative holders marked their price up to 11½ cents. A marked recession in consumption and a large increase in refined stocks were revealed by the October statistics of the Copper Institute, Inc. Improvement is noted in the white metals market, with zinc prices supported chiefly through an adjustment of output to current demand and those for lead through better demand.—W.C.H.

... slants

WHICH TO BUY?—A column of comment in "The Autocar" on the recent automobile show in London brings the following: "Radiator grilles are so much alike nowadays, and as name-signs at Earls Court were not clearly visible to people standing under them, I hear that salesmen had to be careful not to sell a rival firm's cars. I heard of one case of a salesman who stood alongside a rival's car and pointed out the defects of the one opposite only to discover that he was on the wrong stand."

BUGS BY PLANE—Each week California Insectaries, Inc., located at Glendale, ships millions of trichogramma, egg parasites which attack the eggs of other insects, dangerous to crops, to growers all over the continent and as far as Puerto Rico. It is necessary to use airplanes in order to time the arrivals properly as the moths emerge from the eggs only eight days after the eggs are laid.

DIESELS IN TUNNEL—The Port of New York Authority will exclude Diesel-driven trucks from the new Lincoln Tunnel, according to Billings Wilson, assistant general manager of the authority in charge of operations, "owing to their propensity to emit, without warning, a dense, black, odoriferous smoke which obscures the vision of drivers and other cars. While our ventilating system will remove this smoke in a minute or so, the risk of accident in the first two seconds when all visibility is suddenly eliminated is too great in a tunnel with traffic running in opposite directions. The exhaust of Diesel trucks, aside from the smoke hazard, is not as dangerous to human life as the exhaust of gasoline engines due to a lower carbon monoxide content. Since, however, the motorist cannot smell carbon monoxide, but can

Automotive Metal Markets

Now Forecast Gradual Upturn in Steel Output and See Active Buying in 1938; Steel-Making Costs Cut by Scrap Fall

Preponderant in the steel market this week is the conviction that a gradual upturn in the demand may now be expected. With this week's rate of employed ingot capacity down to 36.4 per cent and some of the finishing mills having less than half of their facilities in production, it is significant that no one is talking of shut-downs which, when schedules are as thin as they have been in the last few weeks, would be more advantageous for some mills than operating without the help of any sort of backlog.

Even those usually not given to predictions declare that bottom has been touched, and that while the turn for the better may be slow in ripening into a pronounced buying movement, a larger volume of small lot orders is certain to be recorded in the next few weeks. Then there are prophets galore who, undaunted by the failure of their clairvoyancy in foreseeing the present slump, now see buyers falling over one another early in 1938 to make sure of their steel supplies.

With reference to steel producers' costs, the item coming in for most discussion these days is again that of scrap, only this time not because of its high price, but because today heavy melting steel scrap, which last spring commanded around \$23 a gross ton in Pittsburgh, is now quoted at \$13.50 @

\$14.00. About 17,500,000 tons of scrap a year are bought by the steel makers, so that the difference between their scrap bill at the present levels and those at the high of the year represents around \$175,000,000, which, at a production rate of 35,000,000 tons of rolled steel, would be about \$5 a ton. It is obvious however, that the reason for the prevailing low price levels in the scrap market is the utter lack of buying by the steel mills. The market would quickly respond to any rise in scrap purchases with higher prices. Even so, it is argued, there would still be in all probability a considerable saving to the steel mills compared with the prices which they had to pay while exports for armament making had so much influence on the bulge in scrap prices. Blast furnace interests, taking their cue from the steel price situation, made no change in prices for first quarter 1938 pig iron contracts from those now current. Automotive foundries are taking carload tonnages, as needed.

Bargain prices for tin didn't last long, but consumers took little advantage of even the lowest levels. At the beginning of this week, the price for spot Straits was back at 45¼ cents, with some business done earlier at a shade under 45 cents, which prompted holders to advance their asking figure. On Nov. 10, Singapore cabled that some

smell the irritating aldehyde fumes in a Diesel exhaust, the offensive odor of the Diesel is much more objectionable to tunnel patrons." Only one tube of the tunnel will be available at its opening in December. The other is under construction, and traffic will, for the time being, move both ways in the same tube. Mr. Wilson also said that all trucks which cannot maintain a speed of 20 m.p.h. on the exit ramps will be barred from the tunnel.

SHIP ASSEMBLY—Emulation of the practice of automobile manufacturers of having parts manufactured at central points for assembly elsewhere is recommended by the United States Maritime Commission for the construction of ships. Adoption of the automobile practice was urged in an exhaustive special report to Congress, released Nov. 10. "The older shipyards are burdened with large overhead expense because of extensive investments and a variety of special equipment," said the commission report in referring to automotive practice for ship construction. "We require, if we are to approach foreign costs, more efficient facilities and a more modern technique. Here is an opportunity for American ingenuity to meet the lower costs of foreign yards."

COAST WEATHER—The "Southwest Business Review," published by the Board of Supervisors of Los Angeles County, states in a recent issue that for the first time in its history California motor vehicle registration for the first half of the year passed that of New York and now holds first place in the country. There were very nearly 2,500,000 vehicles registered in that state for the period specified.

Motorized Post Office

A motorized post office designed to render postal, telephone, and telegraph service to the public at festivals, assemblies, exhibitions and other public gatherings was recently demonstrated by the Czechoslovak Government at the International Automobile Show at Prague, according to a report to the Department of Commerce by the office of the American Commercial Attaché, Prague.

40 Years Ago

with the ancestors of
AUTOMOTIVE INDUSTRIES

Acetylene Motor

Since the discovery of Wilson's method of producing calcium carbide many experiments have been made with its product, acetylene, looking to its application for power purposes, particularly in light motors. These experiments have been chiefly confined to Europe, and one of the most recent, reported in *La Locomotion Automobile*, is the acetylene motor of Turr & Chertemps, in which the force of the explosion may be utilized to change a quantity of water into steam, and thus obtain a gradual pressure upon the piston, by using the expansion of the steam to the end of the stroke. From *The Horseless Age*, Oct., 1897.

Automotive Industries

Hudson Motor Car Reports

Hudson Motor Car Co. reported for the nine months ended Sept. 30 net income of \$258,378 after charges or 16 cents a share on the common stock, compared with income of \$2,013,743 before Federal income tax provision, for the like nine months of last year. For the September quarter alone the company reported a net loss of \$805,097 including a non-recurring loss of \$95,239, against a net loss of \$13,061 for the third quarter of 1936.

Reo Motor Car Reports

Reo Motor Car Co. reported for the September quarter a net loss of \$230,820 compared with a net loss of \$222,188 for the like period of last year. For the first nine months of the year there was a net loss of \$648,059 against a net loss of \$417,441 last year.

Gar Wood Industries

Reported net income for the nine months ended Sept. 30 of \$657,121 82 cents a share. Gross sales were \$7,029,931. There is no comparison available for the nine months, but for the full year 1936 the company earned \$911,515 on sales of \$9,425,968, equal to \$1.14 a share.

Plants Enlarged

Several Companies Going Forward With Plans

The largest industrial building constructed in Canada in 1937, the new \$3,300,000 body manufacturing plant recently completed at Windsor, Ontario, by the Ford Motor Co. of Canada, Ltd., is in production providing employment for several hundred automotive workers. This plant is the largest unit in the \$8,000,000 expansion program being carried out by Ford of Canada this year. This factory, which covers nearly 14 acres under one roof, was started only last March. The new building stands 1000 ft. long by 571 ft. wide, providing a floor space of 571,000 sq. ft. for manufacturing purposes. Extensive use is made of overhead conveyors to handle manufactured and assembled parts. These total 18,000 ft. in length and there is an additional 6000 lineal ft. of slat, roller and belt conveyors. Along the finish of the final assembly line, escalators, or moving platforms, are installed on both sides of the conveyor line. As the cars move along the workmen move forward at the same speed until they complete their operation on each unit.

McCarter and Nairne, Vancouver architects and structural engineers, have been appointed supervising architects for the proposed \$550,000 assembly plant shortly to be constructed there by Ford Motor Company of Canada. It will be of concrete, brick and steel construction, 320 ft. long and 240 ft. wide. There will be a total floor area of 76,800 sq. ft.

The Morse Chain Co. plants at Ithaca and Detroit have been equipped with new machine tools and production facilities and capacities have been stepped up. Some of the tools recently added are: two grinders, one tool and cutter grinder, on 52-inch boring mill,

eleven automatic lathes, two twin spindle drill presses, two turret lathes and four gear cutters. Morse has also installed new equipment in the heat treating department—one floating control carburizing furnace, two 60 k.w. dense load "Homo" furnaces, and one 60 k.w. "Homo Carb" carburizing furnace.

The addition of another building to the main plant of the Bowes Seal Fast Corp., Indianapolis, manufacturers and distributors of automotive products, is planned for this fall.

Wesley Steel Treating Co., Milwaukee, is establishing a branch heat treating shop at Green Bay, Wis., to serve industries in northeastern Wisconsin and Upper Michigan. The new shop occupies an addition recently built by the Nelson Machinery Co.

Uruguay, Chile Curb Imports

A Uruguayan decree dated November 8, 1937, prohibits until further notice the importation of automobiles, omnibuses, trucks, chassis, bodies and motors, according to a cable from the American Consulate General at Montevideo, made public by the Department of Commerce. This measure was declared to be taken in view of the recent exceptional increase in the imports of automotive products, said to be out of proportion to the current needs of the country, it was stated. It is reported that the government expects to permit the resumption of imports of automotive products by January 1, 1938.

The Chilean import duties on passenger cars, trucks, chassis, pneumatic tires and tubes, and motor vehicle parts, will be increased by one third, under provisions of a decree just announced in Chile, according to a cablegram received in the Department of Commerce from the office of the American Commercial Attaché, Santiago. It is understood that the increased duties will become effective thirty days after the decree is promulgated in the Chilean *Diario Oficial*, the report states.

Security Transactions

Reports through the Securities and Exchange Commission show that there was some buying of automobile company securities in September. Alphabetically arranged they show: Walter P. Chrysler, Jr., director of the Chrysler Corp., acquired 100 shares and he'd 800 at the end of the month; Donaldson Brown, director of General Motors Corp., disposed of 1500 shares and retained 6563; A. M. Andrews from December, 1935 through May, 1936 disposed of 49,600 shares of Hupp Motor Car Corp. stock; C. David Widman, officer of the Murray Corp. of America, acquired 1000 shares and held 1346; G. E. Smith, officer and director of the Reo Motor Car Co., bought 600 and 400 shares, holding 2566.

Grants License

The American Blower Corp. has granted a license to The Torrington Mfg. Co. to manufacture and sell blower wheels under American Blower patent numbers 1,513,763 and 1,648,060.

New Chart Ink

A new recording chart ink has been developed by the Permochart Co., Pittsburgh, especially for use on the renewable permanent recording charts manufactured by this company.

November 20, 1937

November Sales Top 1936 Period

(Continued from page 729)

not entirely accurate because the automobile shows opened a little later last year than in 1937, and reports for the second 10 days of this month will make a better basis for comparison with last year.

Retail deliveries of the Buick division of General Motors numbered 6776, a gain of 34 per cent over the 5048 cars delivered in the like 1936 period and a new high record for any early November period. Production is at the rate of 1200 cars daily and W. F. Hufstader, general sales manager, said that unfilled orders are sufficient to maintain output at a high level for the balance of the year. Sales of used cars by Buick dealers numbered 8872 units in the first 10 days of November, making a total of 27,408 in the last 30 days and reducing used car stocks to a 37-day supply.

Retail sales of new Pontiac cars were reported by C. P. Simpson, general sales manager, at 4983 for the first 10 days of November, against 4288 for the like period last year. Sales of used cars were 8304 against 4615 a year ago and against 7925 in the first 10 days of October this year.

Following the biggest October in its history, Oldsmobile sold at retail nearly 4000 new 1938 Oldsmobile sixes and eights during the first 10 days of November, it was reported by D. E. Ralston, Oldsmobile's general sales manager. Altogether 3915 new cars were delivered during the period, to bring the grand total for the year to

date to 171,074 units, for the most successful year Oldsmobile has ever enjoyed. This is a gain of more than 12 per cent over the 152,410 Oldsmobiles sold from Jan. 1 to Nov. 10 last year.

Retail deliveries of new Packard cars in the first 10 days of November were 2284 units, which represented an increase over the figure for the like 1936 period. M. M. Gilman, vice-president and general manager, said the company has 14,000 unfilled orders and plans to operate at capacity through December.

Chevrolet division of General Motors reported October sales of 61,419 cars and trucks, against 23,929 in the same month of 1936 and 52,154 in the same month of 1933, the best previous October since 1929.

A very active interest in business cars which will result in Hudson's materially advancing its schedule of manufacture of these vehicles is reported by William R. Tracy, vice-president in charge of sales of the Hudson Motor Car Company. "Formal announcement of the new business cars to be made shortly will disclose seven types, all mounted on the six-cylinder Hudson Terraplane chassis which is available in 117 and 124-in. wheelbase lengths with 96 hp. standard and 102 hp. available optionally."

Sales of General Motors cars and trucks to dealers in the overseas markets during October totaled 28,576 units, representing an increase of 24.3

per cent over the volume in October of last year. In the first 10 months of 1937, sales of 305,100 represented an all-time high volume for that period, and an increase of 12.7 per cent over the volume in the first 10 months of 1936. For the 12 months through October, 1937, sales totaled 359,233 units—an increase of 12.5 per cent over the volume in the 12 months ended Oct. 31, 1936. These figures include the products of the corporation's American, Canadian, English, and German factories sold outside of the United States and Canada.

Nash Office in Detroit

C. H. Bliss, vice-president and director of sales, Nash Motors division of Nash-Kelvinator Corp., has confirmed reports that four departments of the executive offices at Kenosha, Wis., will be transferred to Detroit headquarters by Jan. 1, in the interest of economy as well as a centralization policy. Harold E. Long, vice-president and director of purchases, already has moved to Detroit. Within the next few weeks Mr. Bliss and Courtney Johnson, sales manager; A. R. Boscow, advertising and merchandising director; H. M. Salisbury, export sales manager, and J. L. Todd, assistant export sales manager, and in addition several clerks in the statistical department, will move to Detroit. Only 10 to 12 persons will thus be transferred, leaving about 300 at work in Kenosha office. R. B. Elliott, vice-president in charge of production, and R. A. DeVlieg, general works manager, will remain as ranking executives at Kenosha.

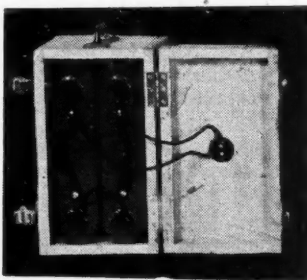
Measures Stopping Distance

A device which will automatically mark the point on the road where the brake is applied when making determinations of stopping distance is being

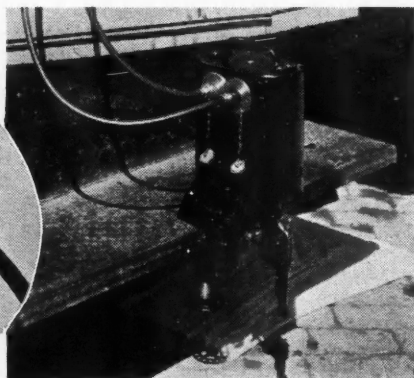
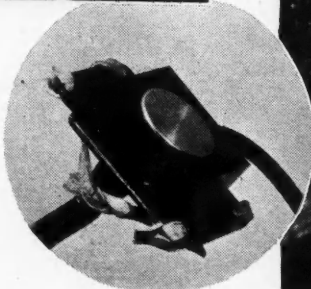
manufactured by Triangle Associates of Baltimore, Md., and marketed under the trade name Projec-Tell Meter. The apparatus includes the following items:

A pavement-marking device consisting of a properly-housed revolver loaded with paint-pigment cartridges, which is fired by an electrically energized mechanism, actuated by a contact switch connected to the brake pedal of the vehicle. Current for these devices is furnished by a storage battery contained in a separate carrying case and having no connection with the regular electrical system of the vehicle.

The revolver, together with its electric firing device, is mounted on a rigid casting, the whole being enclosed in a metal case, through the walls of which the electrical cables are carried. A universal clamping device permits of securing the device to the running board or other part of the vehicle. A measuring-tape hook and a carrying handle are incorporated in the case. Attachments for connecting the switch to the brake pedal are provided, as is a cut-out switch for insertion in the connecting cord, which permits of disconnecting the pedal switch electrically from the Projec-Tell Meter when not in use.



Marking device, battery, and pedal-operated switch of Projec-Tell Meter



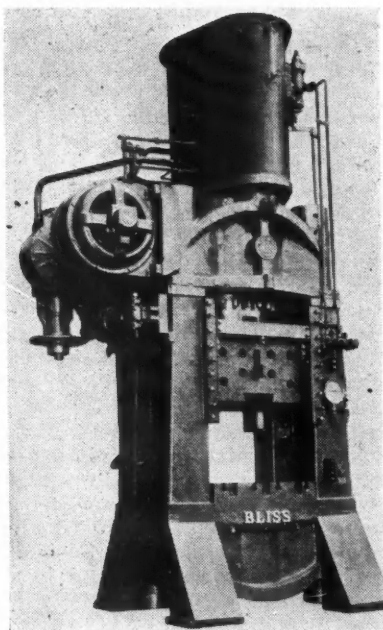


Press

... frame construction, stroke, and control stressed in new Bliss design.

The Hydro-Dynamic Press Division of the E. W. Bliss Co., Toledo, Ohio, has announced a new 1000-ton press. Frame construction, adjustability of stroke and finger-tip control have been given special attention in the designing of this machine.

Side frames are keyed to the crown and bed so that the housings, rather than the tie rods, take any torsional strain. A deep slide is guided by long, adjustable gibs of standard approved design. Stiffness of crown and bed are effected by heavy ribs.



The 1000-ton press recently brought out by The Hydro-Dynamic Press Division of E. W. Bliss Co.

Full electric finger-tip control is provided, both for production operation and for inching. The machine has three speeds forward and a high speed return. The three speeds forward are: a high speed positive advance of 1100 in. per min.; an intermediate pressing speed of 60 in. per min. on pressure capacities up to 250 tons; and a slower pressing speed of 20 in. per min. on pressure capacities over 250 tons. Change from one speed to another is automatically controlled as the pressure increases. The change from quick approach to intermediate speed may be governed by the position of the slide, so that the slide will slow to the inter-

mediate rate of speed just before contacting the work.

A choice of operation under or over 250 tons can be made by turning a selector switch. When the press is operating at pressures below 250 tons, the slow pressing speed is eliminated, as the 1000-ton pressing area is not used. With this choice of operation, pressure is adjustable from below 50 tons to 1000 tons.

The following dimensions of the press illustrated herewith will give an idea of the available working area, capacity, and stroke. The press is designed to operate at about 16 cycles per min. when operating continuously with full automatic control. The shu-height or die-space, is 20 in. and the maximum length of stroke is 15 in. The bed area is 42 in. front to back by 43 in. right to left and the area of the slide face is 37 in. by 37 in. A 27-in. diameter cushion pad in the bed has a 7½-in. stroke and a pressure capacity of 100 tons.

Open Back Press

... Toledo improved model has 12-in. stroke with 3-in. adjustment.

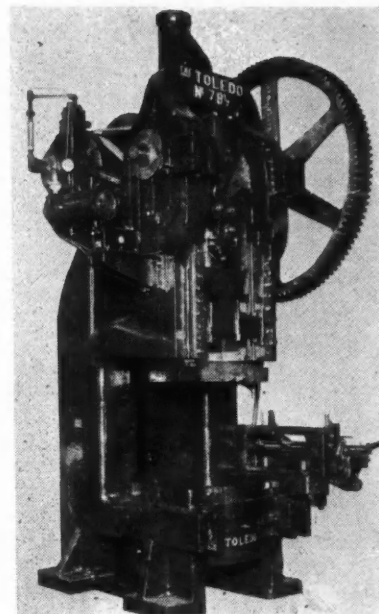
A new model open-back press on fixed legs has been brought out by The Toledo Machine and Tool Co., division of the E. W. Bliss Co., Toledo, Ohio.

The frame of the machine is a one-piece high-test semi-steel casting. Both the driveshaft and the flywheel are mounted on Timken anti-friction roller bearings, while the frame and connection bearings are bronze bushed.

An electric push button control requiring the operator to keep both hands on palm buttons until completion of the working portion of the stroke, an anti-repeat mechanism, an air brake for stopping the flywheel, an air counter-balanced slide, and a crossbar knockout are among the features of this press.

A few of the dimensions are: stroke, 12 in.; 3-in. adjustment of stroke; 20-in. bed to slide, stroke down, adjustment up; bed area 28 in. by 41 in. front to back by right to left; 21½ in. between gibs; and the capped and flanged slide has an area of 24 in. by 28 in.

The machine also has a single roll feed with a seven-roll power driven straightener to provide an automatic method of feeding the stock from 0 up to 12 in. The feed is mounted on the bolster and the level at which the rolls operate can be adjusted up or down to suit the height of the dies.



Toledo open-back press on fixed legs. It has a 12-in stroke with 3-in. adjustment.

Molding Press

... for quantity production of molded plastic and rubber parts.

Announcement of a new automatic hydraulic molding press for quantity production of molded plastic and rubber parts has been made by The Lake Erie Engineering Corp., Buffalo, N. Y.

The press is a fast production tilting head unit with automatic multiple ejection of the molded forms. Its rated capacity is 1000 tons for molds measuring 38 in. by 38 in.

According to the manufacturer, automatic operation of the machine makes it possible for one operator to run four presses.

The press can be supplied with either self-contained pump or for accumulator operation. Molded rubber goods and plastic parts such as pedal pads, casters, gear shift knobs, electrical parts, and other similar products can be turned out in volume production quantities with this machine.

Lock Nut

... one '38 car has over 20 application points for Marsden unit.

The Marsden Lock Nut, in the field for some time, has gained wide acceptance and is being used by many of the largest automobile manufacturers. One of the 1938 cars is said to have over 20 different application points.

Its construction is based on maintaining the outside dimensions of standard nuts, and utilizing a standard form of thread. The difference between the Marsden nut and a standard nut is that (Turn to page 762, please)



AUTOMOTIVE ABSTRACTS

Combustion Data

In order to obtain definite information regarding the chemical reactions which take place during combustion in a gasoline engine, M. Maillard of the Petroleum College of Strassburg condensed the condensable exhaust products and analyzed them. These products settled in two layers, an oleaginous layer and an aqueous layer. The volumetric importance of the oleaginous layer is a function of the volatility of the fuel; with aviation gasoline its volume is negligible, whereas it amounts to 1.5 per cent of the volume of touring-grade gasoline burned, and 5 per cent of the volume of low-test gasoline. In the aqueous layer M. Maillard found acetic acid and traces of formic acid, as well as the aldehydes corresponding to these two acids.

World's Records

During a "Record Week" held on the superhighway at Frankfurt-on-Main, Germany, Oct. 25-29, a number of new world's records were established by Rosemeyer on an Auto-Union and by Gardner on an M.G. Rosemeyer established new unlimited world's records for the standing mile and the standing kilometer, of 138.67 and 117.14 m.p.h. respectively. He also established four new records in the 5-to-8-liter class and eight new records in the 3-to-5-liter class, the highest speed attained by him being in the flying kilometer for the 5-to-8-liter class, viz., 252.47 m.p.h. The M.G. is a small racer and it established four new records in the $\frac{3}{4}$ -to-1-liter class, the mile and kilometer and the 5-mile and 5-kilometer, all flying starts. He attained the highest speed in the flying kilometer, viz., 148.73 m.p.h.

Both Auto-Union and Mercedes competed in the record trials. Mercedes had a new 12-cylinder, very powerful engine, but the streamlining of the body proved unsuitable for such high speeds. It was essentially the same type of body that had been used by it in establishing a road record of 228 m.p.h. last year, but wind-tunnel tests in the meantime had shown that the resistance coefficient could be reduced by slightly curving the under side of the nose upward. This, however, together with the higher ground clearance, produced so much lift at the front at over 200 m.p.h. that the car no longer responded to the steering gear.

The engineer of the Mercedes firm who is responsible for the racing cars said that the bodies were developed by wind-tunnel tests on 1:2.5 wooden models at Stuttgart Technical College. In addition to determining the air-resistance coefficient, the streamlining was tested by exploring the outer surface with woolen streamers. If the streamer flows out evenly the streamlining is good, but if it stands up or flaps about it indicates eddies. Other features of the new Mercedes bodies were the very narrow radiator inlet, a big factor in the air resistance, and a higher windshield which was necessary because the original one created an unpleasant pressure on top of the driver's head.

To obtain the greater speeds this year the bodies were made smoother and given a high varnish finish. The object is to eliminate all bumps and joints, as the slightest surface flaw adds to the resistance.

Auto-Union, according to its chief engineer, also developed its body shape by wind-tunnel tests on half-size wood models. This model had to be made very accurate and carefully finished. In the first Auto-Union racer, brought out two years ago, the wheels were not enclosed, but later wheel fairings were added and now everything

possible is enclosed. The first tests were made on the actual car in the wind tunnel at Tempelhof (Berlin) airport, but now tests are made on a half-scale model in the wind tunnel at the Zeppelin Works in Friedrichshafen, which is said to be not only much cheaper but just as satisfactory—*The Autocar*, Nov. 5.

Methanol in Gasoline

In one of the papers presented at the World Petroleum Congress in Paris last summer, the author, M. Wilke, dealt with various substitute motor fuels which may be used separately or in admixture with petroleum products. He placed particular emphasis on methanol (wood alcohol). The calorific energy per unit of volume of combustible mixture is 2.6 per cent less than that of a gasoline mixture, but this disadvantage is more than compensated for by the intense cooling effect produced by the vaporization of the alcohol. Operation on wood alcohol results in a gain in power of about 7 per cent. Moreover, wood alcohol has a very high anti-detonating value, its octane number being approximately 135, and it permits of the use of high compression ratios up to 12. Tests made on engines of different types all showed a higher thermal efficiency with methanol than with either gasoline or benzol.

Tractor Use Grows

Secretary Wallace Credits Lighter, Faster Units

The sharp growth in the sales of farm equipment latterly is traceable in part to the development of lighter, faster and more adaptable power units, making possible the use of these units and attachments on smaller farms than was possible with the older, large equipment, according to the annual report of the Secretary of Agriculture. The report pointed out that the power units are applicable not only to actual crop-raising and harvesting, but to such uses as the control of plant diseases, insect pests and soil losses.

The report said that many farms could carry more livestock and employ more labor if they were better drained or cleared of stumps. "Now," said the report, "there are general-purpose tractors, on pneumatic tires, light and fast, and easily handled in small fields or taken on the road to haul produce at 15 miles or more an hour." It then cited a number of types of modern farm machinery now available.

With reference to the Federal highway program, the report stated that the Department of Agriculture administered a broadened program during the fiscal year, including the construction of new surfaces and the improvement of existing ones. The year's work resulted in the completion of 27,488 miles of highways and the elimination of 1149 grade crossings. Of the total mileage 23,933 miles were handled with Federal funds administered solely by

the Department. Other work included the repair of flood-damaged roads and the construction of public-lands roads. The current program involves 17,909 miles of roads. The Forest Service operations have and will add to the total of work done. In the grade-crossing elimination program for 1938 are plans which will use remaining portions of the \$200,000,000 funds authorized in 1935. Employment for the year on work supervised by the Bureau of Public Roads amounted to 1,792,760 man-months, with indirect employment estimated at an additional 2,868,000 man-months.

The Federal highway system now includes 227,000 miles and is almost entirely surfaced. The report stated that traffic requirements call for wider and better roads than ever before, and for the elimination of more grade crossings. Federal policies were widened a few years ago to permit work within cities where the worst congestion often occurs. A new \$25,000,000 program for each of the years 1938 and 1939 will be concentrated on the development of feeder roads.

API Sets Up Fuels Group

Appointment of a Committee on Motor Fuels, which will collect, analyze, and make available to the public and to the petroleum industry information regarding present and future fuels for motor vehicles, was announced by Axtell J. Byles, just elected president of the American Petroleum Institute for a fourth term at the association's 18th annual meeting in Chicago.

In addition to collecting and coordinating information available from oil and automotive companies in this country, the committee plans to assemble data regarding experiments and experience abroad. Studies will cover not only well-known petroleum fuels, but also synthetic admixtures containing alcohol, benzol, or other constituents, wood gas, and oil fuels made from coal. The group will undertake to assist and to supplement activities in the same direction by the government and by consumer groups.



Gisholt Machine Co. has issued a new catalog of standard tools for the 11 and 2L turret lathes. The catalog also contains data on standard chucking tools and cross slide tools as well as Gisholt chucks, boring bars and machine attachments.*

The September-October issue of "Trade Winds," publication of the Wright Aeronautical Corp., contains an article on the development and use of cruising power calculators, made advisable with the application of constant speed propellers.*

J. W. Williams & Co., New York, has published a booklet on the selection and use of wrenches. It also contains a catalog.*

New Departure division of General Motors has issued a booklet entitled "Sealed" giving data on sealed, lubricated ball bearings. It is booklet D.*

A new book, "Modern Weights and Measures," has been published by the American Institute of Weights and Measures. It is available at \$1 per copy.

Lathes, drill presses, arbor presses, and shapers are pictured and described in the new Atlas equipment catalog No. 28, for 1938, released by Atlas Press Company. Two new Atlas machine tools are introduced: a shaper with 7-in. stroke, and a back-geared screw-cutting lathe with 6-in. swing.

The Transportation Association of America has published a brochure entitled "Labor under the Isms."*

A new, 124-page handbook on belt conveyors and bucket elevators has been published by the Stephens-Adamson Mfg. Co., Aurora, Ill. It is widely illustrated, contains use and design data.*

Soluble cutting oil is discussed in a new booklet issued by the D. A. Stuart Co., Ltd., Chicago.

The International Nickel Co., Inc., has issued a bulletin, U-3, on the applications of nickel alloy steels for hand tools.*

*Obtainable from editorial department, Automotive Industries. Address Chestnut and 56th Sts., Philadelphia.

Car Materials Dip

(Continued from page 731)

in the number of employees. This was the result of direct wage increases and of overtime wages paid, either due to inefficiency or to the shortening of hours of work.

Following is a table showing market prices for various classes of materials used in the fabrication of an automobile. Prices are given for 1936, for July, 1937, and for the first week in November, with comparisons showing the changes, at Nov. 4, from July and from the averages for the year 1936:

| | Aug. 1936 | July 1937 | Nov. 4 1937 | Aug. 1936 | July 1937 |
|--|--------------|--------------|----------------|-------------------------|--------------|
| | | | | per cent change from | |
| Sheet steel—cents per lb..... | 3.0 | 3.6 | 3.6 | +20% | .. |
| Forging steel—dollars per gross ton... | 36.80 | 43.00 | 43.00 | +17 | .. |
| Cast iron—dollars per gross ton..... | 19.70 | 24.00 | 24.00 | +22 | .. |
| Wool—cents per lb. | 88.1 | 98.00 | 87.0 | -1 | -11% |
| Rubber—cents per lb. | 16.5 | 19.0 | 14.8 | -10 | -22 |
| Copper—cents per lb. | 9.5 | 13.8 | 11.4 | +20 | -17 |
| Lead—cents per lb. | 4.7 | 6.0 | 5.0 | +6 | -17 |
| Zinc—cents per lb. | 5.3 | 7.3 | 6.1 | +15 | -16 |

Books

of automotive interest

The Retardation of Chemical Reactions, by Kenneth C. Bailey, professor of Physical Chemistry at the University of Dublin. Published by Longmans, Green & Co., New York.

At first glance the subject of this book might be considered as highly specialized and one having few practical bearings. As the author points out in his preface, chemists in general are more concerned with accelerating than with retarding chemical reactions. Yet there are a good many industrial products whose object is to retard some chemical reaction. In some cases the physical effects are improved if the reaction is slowed down while in others the reaction is wholly undesirable and would be prevented if it could be, but failing that, measures are taken to slow it down as much as possible.

The book is written in the form of a critical review of the periodical and patent literature on the various forms of "chemical retardation" covered by it, and the author is to be commended for his diligence in searching the literature of the subject. This method of composing a work on a scientific-technical subject is perhaps most satisfactory from the standpoint of the research worker, who is given a brief summary of practically all that has been written on any particular subject, together with a very extensive bibliography which enables him to look up original sources on any phase of the work that may be of special interest to him.

Of particular interest in the book from the automotive standpoint are the

chapters on Anti-Knock Compounds, the Protection of Rubber, and Prevention of Metallic Corrosion, which, fittingly enough, follow one another in the order given. The various subjects are dealt with from both the theoretical and the practical standpoints. In the chapter on Anti-Knock Compounds, for instance, there are numerous references to the writings of Midgley, Boyd, Edgar, Rassweiler, Withrow, Ricardo, Callendar, King, Ormandy and others. Not only the literature of the subject in the English language is covered, but that in foreign languages as well, and in the chapter on Anti-detonants there is reference even to some work done on the subject in Japan. While the three chapters mentioned are of particular interest from the automotive standpoint, they together cover only about 50 of the nearly 500 pages of the book, and chemical retardation, also referred to as inhibition and negative catalysis, seems to be covered in all its various phases. The bibliography given at the end of the volume is particularly extensive, listing 1630 titles and covering nearly a hundred pages.

Tire Output Cut

(Continued from page 731)

associated lines which include Hood, Miller, Diamond and Brunswick tires; the General Tire & Rubber Company, Firestone Tire & Rubber Company, Mohawk Rubber Company, Goodyear Tire & Rubber Company, Kelly-Springfield Tire Company and Pennsylvania Rubber Company.

Last February, when most manufacturers discarded the road hazard guarantee, they claimed it had been costing the industry \$10,000,000 a year in unfair tire adjustments. The road hazard guarantee was originated by Standard Oil for its Atlas tires in 1931.

Seven states now have ruled the road hazard guarantee illegal on the ground that it is the same as an insurance policy and that tire manufacturers and dealers are not licensed to sell insurance. Kentucky is the latest state to clamp down on use of the guarantee. The seven states are: Ohio, Arizona, Arkansas, Kansas, South Carolina, Georgia and Kentucky.

Calendar of Coming Events

DOMESTIC SHOWS

Indianapolis, Automobile Show..Nov. 11-20
Baltimore, Md., Automobile Show,
Nov. 13-20
Cleveland, Ohio, Automobile Show,
Nov. 13-20
Rochester, Automobile Show.....Nov. 13-20
Springfield, Mass., Automobile Show,
Nov. 14-20
St. Louis, Mo., Automobile Show..Nov. 14-21
Portland, Ore., Automobile Show..Nov. 14-21
Denver, Colo., Automobile Show,
Nov. 15-20
Milwaukee, Wis., Automobile Show,
Nov. 17-24
Kansas City, Mo., Automobile Show,
Nov. 27-Dec. 4
A.S.I. Show, Navy Pier, Chicago,
Dec. 6-Dec. 11

FOREIGN SHOWS

Great Britain, 36th Scottish International Automobile Exposition,
GlasgowNov. 12-20
Montreal, Que., Automobile Show,
Nov. 20-27
Peru, Automobile Show, Lima,
Dec. 23-Jan. 6, 1938

CONVENTIONS AND MEETINGS

American Automobile Assoc., Annual Convention, New York.....Nov. 19-20
American Standards Association, Annual Meeting, New York City....Dec. 1
MEWA Annual Convention, Chicago,
Dec. 3-4

American Society of Mechanical Engineers, New YorkDec. 6-10
Exposition of Chemical Industries, New YorkDec. 6-11
SAE National Production Meeting, Flint, Mich.Dec. 8-10
American Engineering Council, Annual Meeting, Washington, D. C.,
Jan. 13-15, 1938
SAE Annual Meeting, Detroit,
Jan. 10-14, 1938
American Road Builders' Association, ClevelandJan. 17-21, 1938
American Society for Testing Materials, Spring Regional meeting, Rochester, N. Y.Mar. 7, 1938
SAE National Passenger Car Meeting, DetroitMar. 28-30, 1938



Besides **AUTOMOTIVE INDUSTRIES** (weekly) the Automotive Division of the Chilton Co. publishes the following magazines: *Automobile Trade Journal* (monthly, to automobile dealers exclusively); *Motor Age* (monthly, to operators of independent repair shops); *Motor World Wholesale* (monthly, to wholesalers of automotive equipment) and *Commercial Car Journal* (monthly, to fleet operators and the truck trade). Excerpts from the most recent issues of each of these magazines interpret significant events in every major vocational division of the automotive industry. Such excerpts will be a monthly feature in **AUTOMOTIVE INDUSTRIES**. In order to give manufacturing readers a clue to certain merchandising and service aspects of the automotive industry which are normally outside the scope of an industrial publication.

From **MOTOR AGE**

"Even greater accuracy will be necessary in tuning these (1938) passenger car engines because of the higher compression ratios."

* * *

"... we've seen many a service man ruin a good disposition and, occasionally, a couple of thumbs in attempting to remove a worn out headlight or tail light bulb from its socket. ... There's a solution. ..."

From **MOTOR WORLD WHOLESALE**

"Oil-company competition in equipment sales looks like it may be on its way out again—not in one bold, concerted stroke by every oil company, nor, perhaps, ever completely—but at least to an extent that will give jobbers an opportunity to get more business once again in a market in which they were beginning to believe they couldn't compete."

From **AUTOMOBILE TRADE JOURNAL**

"Toledo's auto show was picketed for two days by members of the United Automobile Salesmen, a union affiliated with the UAW and CIO. By Oct. 30, an agreement was (Turn to page 762, please)"

By H. E. BLANK, JR.

CONSUMPTION of 75,000,000 sq. ft. of laminated glass by the automotive industry last year coupled with the fact that, only 15 years previously, to equip one automobile with safety glass cost \$300 is sharp evidence that the makers of glass have kept pace with the fast tempo of modern technological development.

As much of the glass used by the automotive industry is in the laminated form, safety glass will claim the spotlight in this discussion. However, many new types of glass recently developed appear to have potential possibilities for use by the automotive industry in the future. Included among these are fibre glass which has been proved valuable as thermal insulation and as an excellent filtering medium; tempered glass which might conceivably find widespread application for use in automobile windows. At the present time the automotive industry is the largest single consumer of plate glass in this country. According to the Annual Statistical Issue of *Automotive Industries* for 1937, the industry takes approximately 72 per cent of the total output of plate glass in the United States, which for 1936 amounted to 200,354,838 sq. ft.¹

In the decade that safety glass has been installed on production vehicles—which began with adoption of the material for windshields by the Ford Motor Co. in 1927—the research efforts of the glass manufacturers directed toward improving the product have been concerned mainly with the plastic used between the sheets of glass. Today this is still true.

A plastic used today on about 25 per cent of the cars produced here is cellulose nitrate plasticized with camphor. This was the original plastic used by J. C. Wood, an Englishman, who is credited with being the first person to conceive the idea of making non-shatterable glass by cementing a thin layer of plastic material between two sheets of glass.

Considerable grief resulted from the use of this material for windshields in the first years of its use by the automotive industry due to the fact that the plastic tends to decompose when exposed to solar rays of a magnitude less than 3650 Angstrom units. The reader will doubtlessly recall noting the safety glass windshields of cars of 1929-

¹ *Automobile Facts and Figures*, 1937 edition.

1930 vintage that were objectionably discolored. A natural subsequent development was a protecting type of glass which was green-tinted or in some other form that would absorb actinic rays.

Another plastic, cellulose acetate plasticized with diethyl or dimethyl phthalate, was developed in 1931. It was much more stable under the influence of sunlight and was very soon adopted by a number of large producers for use in safety glass.

Acrylate resins plasticized with dibutyl phthalate are also used today in safety glass. These are said to be resistant to water penetration, virtually unaffected by solar rays, and clear. J.

1725 Acres

Hervey Sherts, superintendent, Duplate Plant, Pittsburgh Plate Glass Co., Creighton, Pa., has written that "perhaps the outstanding difference between the acrylate plastic and the cellulose nitrate and acetate plastics is its great stretchability. This property contributes to laminated glass what is known as a yielding break or stretching rather than a drum-head break."

The three plastics mentioned have one weakness in common. They tend to lose strength at atmospheric temperatures of about 0 deg. Fahr. According to Mr. Sherts, they are only one-fifth to one-tenth as resistant to break tests at 0 deg. Fahr. as they are at 70 deg. Fahr.

Vinal plastic developed recently by the Pittsburgh Plate Glass Co.'s Duplate Research Laboratory is reported to not have this tendency to brittleness at low atmospheric temperatures. The new plastic sheet is made by compounding a special vinyl acetal resin with a glycol hexoate plasticizer. Derivation of the commercial trade-name Vinal results from a combination of the words vinyl and acetal. The Union Carbide and Carbon Chemicals Corp.'s Fellowship at Mellon Institute cooperated with the Duplate Laboratory in the development of the resin and plasticizer.

In the same article written by Mr.

Automotive Materials

Sherts and referred to above² some data are given on the ability of safety glass composited of the new plastic to withstand impact at low temperatures. The laminated glass is reported to "withstand the half-pound steel ball test approximately ten times as great as

a cement. The assembly is subjected to a pass through heated rollers during which operation the air between the glass and plastic sheets is squeezed out and the three sheets are adhered together around the edges. The central portion of the assembly is not pressed

together in this preliminary operation because strains would be set up along the edges of the fabricated piece. These strains would be objectionable because they tend to result in cracking and edge separation of the final product. For final pressing, the laminated glass is immersed in liquid contained in large autoclaves, or pressure cookers, where it is subjected to a pressure of about 180 lb. per sq. in. and temperatures ranging between 240 deg. Fahr. and 300 deg. Fahr.

In the second named process, plastic in lacquer form is flowed on the surface of the glass. After proper drying, the coated plates are wetted with a solvent

es of Safety Glass for U. S. Cars

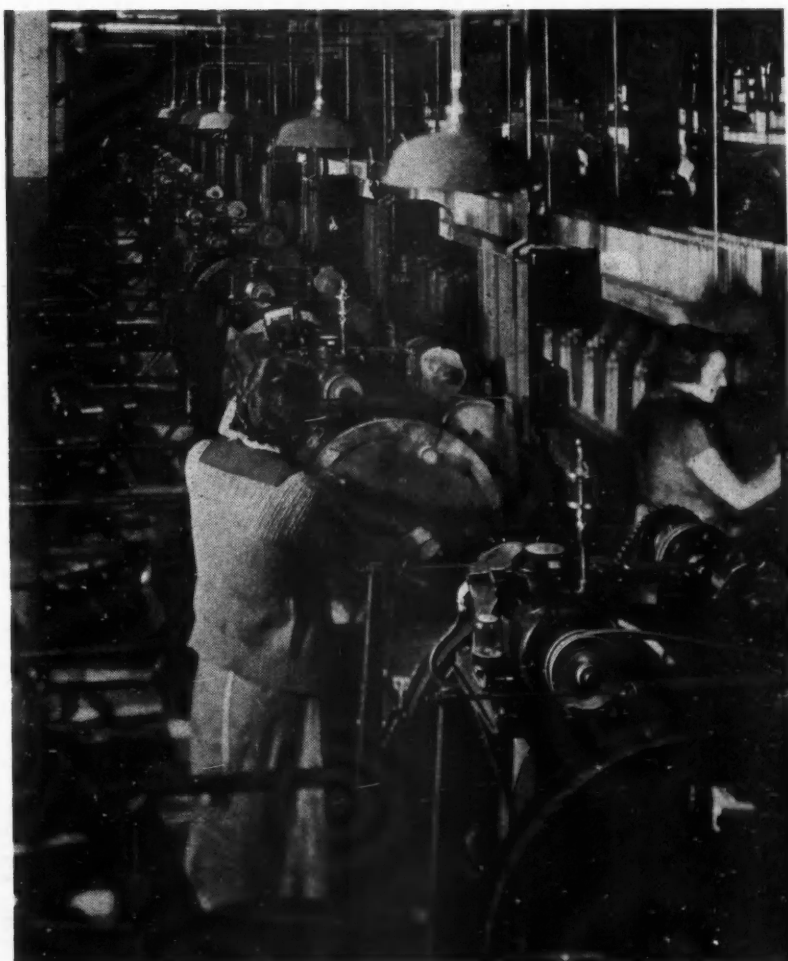
nitrate and acetate types of safety glass at 0 deg. Fahr.; approximately four times as great at 70 deg. Fahr.; and approximately two times as great at 120 deg. Fahr. Samples of this material, measuring 12 in. by 12 in. withstand the blow of a one-half-pound steel ball dropped approximately 40 ft. at 0 deg. Fahr.; 80 ft. at 70 deg. Fahr.; and 40 ft. at 120 deg. Fahr."

Further tests have been made to investigate the effect of a human body being thrown against this type of safety glass. When an object is used to produce a comparable effect, the glass is found to crack and bulge about four inches. If the glass is in a frame it tends to pull out rather than break into small pieces.

The principal processes in current use for manufacturing safety glass are the plastic sheet process and the "flow-on" process. In the plastic sheet process a sheet of plastic about 0.025 in. thick is pressed between two plates of glass which have been previously coated with

² ASTM Bulletin, March, 1937.

A battery of automatic edging machines which grind down the edges of Duplate after lamination.





Sandblasting the Duplate trademark at the Pittsburgh Plate Glass Co.

and pressed together. This causes the plastic sheets to join and form a single sheet between the plates of glass.

A number of photographs typical of the manufacturing methods employed in producing automotive safety glass are reproduced herewith. Briefly, the manufacturing methods may be generally described as follows: In one plant where the operations are typical, the plate glass is first cut to size, then cleaned and dried. The glass then passes under pendulum-like arms from which a transparent cement is sprayed on the upper surface of the glass. Thin sheets of plastic are placed manually by operators on the sized glass and then an adjoining plate is placed on top of the plastic.

This assembly is passed through an electric oven and between a series of rollers which, by applying pressure to the exterior surfaces of the safety glass assembly, force out air and provide a permanent edge seal. The latter prevents fluid from entering between plates during the final hydraulic pressure.

The pieces of safety glass are then stacked on racks and lowered into the autoclave filled with a special oil. When the tank is sealed, pressure and heat are applied to bring about permanent adherence of the three sheets.

Final fabricating operation include the scraping of the marginal edges of the plastic intermediary sheet to a depth which will allow weather-proofing of the edges. The edges are then sealed, ground and polished to final finish. Another bath, an inspection, and the safety glass is ready for installation.

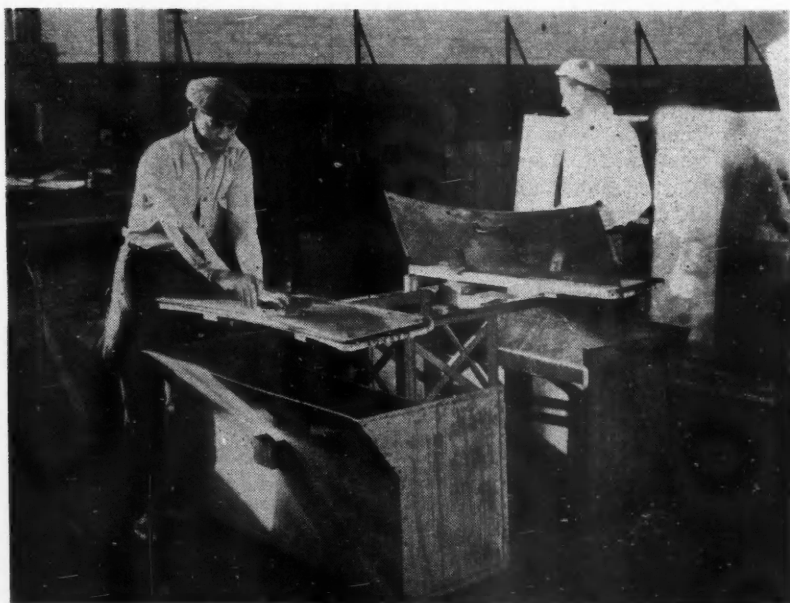
Plate glass is coming into more general favor for use in laminated glass for automotive vehicles due to the fact that it assures clear, undistorted vision. The manufacture of plate glass is in itself a highly modernized process. Of primary importance is the absolute necessity for purity of the basic ingredients of silica, soda ash, limestone, salt cake, and cullet or broken glass.

Briefly, the method of manufacture

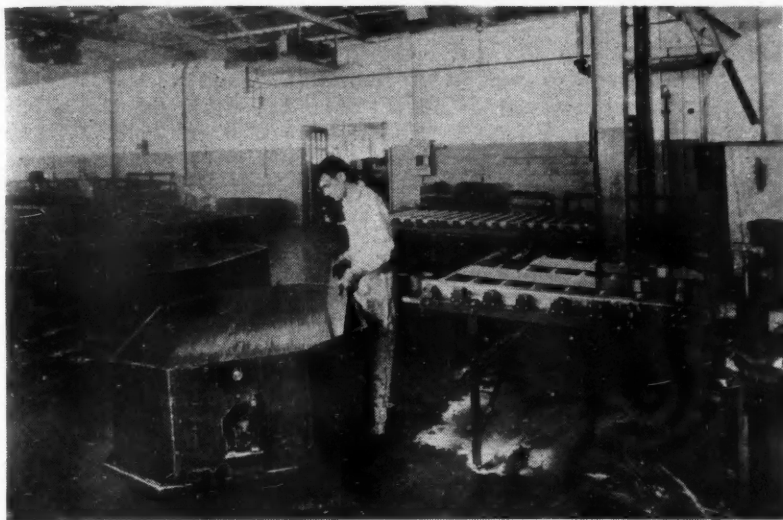
today is to introduce the mix, consisting essentially of the materials just mentioned, into a tank filled with molten glass at a temperature of approximately 2600 deg. Fahr. The molten glass flows out from the opposite end of this tank between water cooled rollers which compress the glass to desired thickness. The continuous production flow continues on to the lehr, or annealing oven, in which the temperature of the glass is slowly reduced. Having passed through the lehr, the glass is then cut into sections and placed on small flat cars. These cars move forward continuously, and the glass is subjected to numerous grinding and polishing operations which proceed successively from coarse to fine abrasives—sand, fine emery, and iron oxide. The process is repeated for working the opposite side. Final finishing calls for a bath in muriatic acid to remove traces of processing materials, inspection, marking, and cutting. The primary difference between plate glass and window glass is that plate glass is polished, while sheet glass is simply fire-finished.

The cutting of glass is still a skilled occupation, but with development of machines with a high degree of cutting accuracy it appears that the manual methods will be rapidly superseded.

Of the recent developments in glass referred to at the outset of this article it will be appropriate here to give some details on tempered glass. It is made by uniformly heating ordinary glass to a temperature of about 1100 deg. Fahr. and then chilling quickly with jets of air. One source of information ex-



Here a metal template is being used to cut the proper shape and size of a windshield at the Libby-Owens-Ford plant.



The cradle shown is lowered in an "autoclave" where each glass sandwich is subjected to pressure. Some minutes later they emerge from the scalding liquid submersion as a single pane. This view is of a Libby-Owens-Ford operation.

plains that the chilling action results in balanced strains being set up in the glass, the surface being under compression and the interior under tension. Strengths of the order of five to seven times greater than ordinary glass are said to result.

Apparently there are several characteristics of this type of glass which are regarded as objectionable for certain applications. One authority with whom the writer discussed this material suggested that tempered glass, at the present stage of its development, did not appear practicable for use in windshields due to a tendency when cracked to break into small granular particles. Hence, if a stone struck the windshield with sufficient force to crack the glass, the resulting granulation would interfere dangerously with visibility of the driver. It also seems that tempered glass cannot be cut to pattern sizes and shapes, or successfully edged after tempering.

Another new type plate glass, trade-named Solex, will absorb an appreciable amount of solar heat and at the same time pass most of the sunlight.

Indirectly related to the automotive industry is the use of glass in a binder compound for marking traffic lanes. This is the Refract-O-Lite system which employs small clear glass spheres suspended in a binder compound of a consistency said to be practicable even when thinner than that of paints generally used for the purpose. Reflected light from stripes laid down on the highway of this material is reported to be 2000 times as bright as the painted stripe. Abrasive tests are claimed to

show that the granules of glass remain unharmed under conditions where paint would deteriorate rapidly. Further, these glass granules are not destroyed by the ultraviolet rays of the sun which principally cause the breakdown of paints.

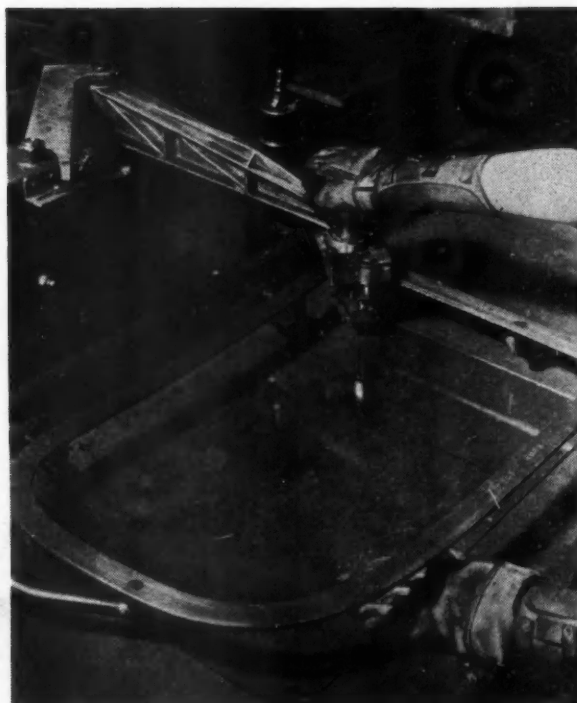
Another highway application of glass is found in the Midtown Hudson Tunnel in New York City, which when completed will have two tubes. The longer tube will have some 800,000 molded

glass tiles; the shorter, 600,000. These tiles are assembled to bronze grippers and imbedded in concrete slabs of the ceiling so that the outer surfaces form a glazed area which is intended to diffuse reflected light and to minimize objectionable glare.

Successful sealing of glass to metal has been found to be dependent upon a characteristic of glass which was discovered just in the past few years. It seems that certain physical properties of glass hinge on the character of the heat treatment to which the glass has been subjected. In this connection E. Ward Tillotson, assistant director, Mellon Institute of Industrial Research, Pittsburgh, Pa., states that "when two specimens of the same glass are subjected to certain different thermal cycles, and brought again to room temperature in perfectly annealed condition, it is found that certain physical properties of the two specimens are slightly different. While this phenomenon is perhaps not wholly understood, the knowledge of it has made possible the production of glass to metal seals that are substantially free from strain, and therefore less liable to breakage from this cause."

Fibre glass has only been available commercially in large quantities for a very few years. Much research in developing this material has been done by the Owens-Illinois Glass Co., Newark, Ohio, in collaboration with the Corning Glass Works. The present process of manufacture consists essentially of passing molten glass through a

Cutting to shape before lamination at the Pittsburgh Plate Glass Co. The steel template forms a track for the cutter.



number of fine holes, and the resulting streams are drawn into fibres by steam. Chemical stability and heat resistance characteristics of fibre glass contribute to its value as filtering material. In addition, the glass does not pack under relatively high pressures. With regard to this material it is interesting to note the following statement of Games Slayter, director of research and development, Industrial and Structural Products Div., Owens-Illinois Glass Co. "It is in filtration that the surface condition of the glass fibre shows its importance. Where an ordinary glass bottle has 90 sq. in. of exposed surface, a

fine fibre, weighing as much as the bottle, has 8,740,000 sq. in. exposed. If it were not for the stable characteristics of glass, any chemical attack would be ruinously fast on such an area."

Considerable work of real value in standardizing the quality of safety glass and extending its use through encouraging state legislation requirements has been done by the American Standards Association. A code which sets forth specifications and methods of test for safety glass is issued in pamphlet form by the ASA under the title of "American Tentative Standard Safety Code for Safety Glass for Glazing Mo-

tor Vehicles on Land Highways." The existing code was approved in 1935 and we understand that at the present time a revision stipulating that the letters ASA be marked on each piece of safety glass (that meets the requirements of the code) is being considered.

A majority of states now have in some form or another laws requiring use of safety glass in automotive vehicles. The latest survey that we have seen gives the information that 28 states have laws requiring safety glass all around on new vehicles, six states partial, and no bills in 15 states. This included the District of Columbia.

Automotive *Materials* NEW DEVELOPMENTS

Some Data on Metal Powders

Of the metallic powders being used today, lead is about the most recently atomized and flaked material, according to a report in *Mining and Metallurgy*. The material at first was too malleable to work easily. A lead paste is now made of 90 per cent metal and 10 per cent of mineral spirits. This makes a good protective coating when mixed with a suitable vehicle; it works well when used for coating iron or other materials that may be attacked by sulfuric or even hydrochloric acids.

Finely divided metallic flaked lead can be applied to surfaces without priming. It can be used for coating zinc, or other metallic sheets, and when so used can be bent often without cracking the protecting layer. Some of the lead powder is so fine as to show a Brownian movement under the microscope.

Brake manufacturers find lead powders work well in brakebands, for the material does not bind. Used in bearing greases, lead has lubricating properties that prevent scoring, and worn shafts and bearings can be resurfaced by the lead. Metallic lead may also possibly serve in place of lead oxide on pipe threads and pipe joints, as the material does not freeze in the joints if oxygen does not get to them.

Many of the metallic powders are extremely fine; tin-lead powders will practically all pass a 300-mesh screen and about 70 per cent will be less than 18 microns. Among the metals that have been powdered are aluminum, antimony, bismuth, cadmium, chromium, cobalt, gold, iron, lead, manganese, molybdenum, nickel, paladium, silicon, silver, tellurium, tin, titanium, tungsten, vanadium, and zinc.

About 10,000,000 lb. of aluminum powder are used yearly for aluminum paint, 2 lb. of aluminum being needed to cover 800 sq. ft. of surface.

Nickel powder is used in the hydrogenation of organic products in general, as by the oil companies for making aviation gasoline.

NACA Studies Plastics For Aircraft Windshields

Study of the suitability of synthetic resins and cellulose plastics for aircraft windshields has been made by The National Advisory Committee for Aeronautics, and a report of the findings was recently made in the *Technical News Bulletin*.

The following types of transparent plastics were found to be available commercial or experimentally: cellulose nitrate, cellulose acetate, cellulose acetobutyrate, ethyl-cellulose, acrylate

and methacrylate esters, vinyl chloride-acetate, vinyl acetal, glyceryl phthalate, styrene, and phenol-formaldehyde. The behavior of these materials was determined with respect to light transmission; freedom from haze, surface imperfections, and constituents which reduce or distort vision; resistance to weathering and to surface abrasion; impact strength; dimensional stability; resistance to the action of water and cleaning fluids; bursting strength at normal and low temperatures; and flammability.

Cellulose acetate plastic was found to have excellent impact strength, bursting strength, and flexibility, but the commercial products tested varied considerably in resistance to weathering, and all were subject to marked shrinkage in one year's time. The shrinkage produces warping and sets up strains in the plastic sheets, which cause them to craze and crack. These strains are believed to be the cause of the spontaneous cracking of cellulose acetate windshields after they have been in service for six months or longer. This is particularly true of windshields exposed to the low temperatures encountered at high altitudes. A great deal of variation was observed in the weathering resistance between cellulose acetate sheets received from different manufacturers and also between different lots of the material from the same manufacturer.

The acrylate resin plastic was found to be remarkably transparent, more stable to light and weathering, and more resistant to scratching than cellulose acetate, but it is deficient in impact strength and flexibility. Surface crazing of the acrylate resins was noted after one year of exposure outdoors, and also after storage for a similar period. It is claimed, however, that a method of processing has been developed which eliminates this tendency.

Other transparent plastics, such as cellulose nitrate, ethylcellulose, vinyl chloride-acetate resin, and vinyl acetal resins, failed in resistance to weathering after approximately three months. Glyceryl-phthalate, styrene, and phenol-formaldehyde resin plastics discolored markedly on exposure to sunlight or ultraviolet light from a carbon-arc lamp, and also lacked flexibility. A sample of cellulose acetobutyrate was practically unchanged after 12 months of exposure. With the exception of the cellulose nitrate, cellulose acetate, and acrylate resin plastics, the materials tested were of an experimental nature and were not recommended for use on aircraft. Many of the undesirable properties observed for these experimental materials will undoubtedly be eliminated in the course of development, and it is not improbable that some of them will later become available in a form suitable for windshield use.

Pending the results of further tests on samples of cellulose acetate, acrylate resin, and other plastics, which have been prepared by the manufacturers using modified compositions and methods of processing to overcome the defective behavior noted during the course of this investigation, it is concluded that the problem of choosing between cellulose acetate and acrylate resin plastics for aircraft windows at present appears to hinge on the required impact strength. If a relatively high strength is necessary, the cellulose acetate sheets are much superior to the acrylate resin. However, if this is not essential, then the superior clarity and weathering resistance of the acrylate resin makes it more desirable. Both the cellulose acetate and the acrylate resin have the advantages of being lighter in weight than glass and of being readily fitted to curved openings.

New Plant For Firestone

Continuing a program of diversification of its manufactured lines and of decentralization, Firestone Tire & Rubber Co., Akron, has formed the Firestone Rubber & Latex Co. and has pur-

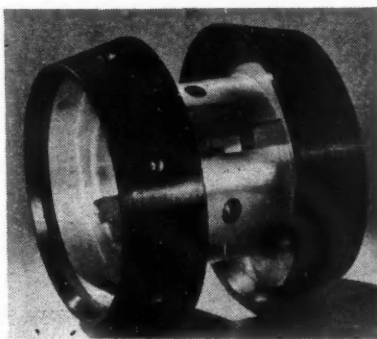
chased five large cotton mills and 20 subsidiary buildings of the American Printing Co., Fall River, Mass. The new plant will be reconditioned for manufacture of new Firestone sponge rubber and latex products, including latex thread, adhesives, battery separators, rubber cushions and upholstery.

In the development of its new line of products, the company will use crude rubber latex shipped direct from its own rubber plantations in Liberia, Africa.

Plastic Designs of Automotive Interest

Progress in the plastics industry this past year was recently spotlighted with the announcement of awards in the Second Modern Plastics Competition. Several of the winning designs are of especial interest to the automotive industry.

An airplane windshield, fabricated from Plexiglas, a plastic material manufactured by Rohm & Haas Co., Phil-



The Brown & Sharpe clutch body ring which won honorable mention for that company in the Modern Plastics Competition. It was made and molded of Textolite by General Electric.

adelphia, for the Bellanca Aircraft Corp., Newcastle, Del., received first prize in the industrial classification.

The use of plastics in this instance offers the advantages of light weight, high impact strength, and streamlining. Weight is saved because the material can be used in very thin section and its specific gravity is only 1.18. Danger of breakage is reduced because of the high strength of the material. When broken by a sharp blow, the material does not shatter. The Plexiglas sheet can be easily formed into a three-dimensional curve, making it possible to use a windshield which conforms to the stream-lined fuselage of the airplane.

An instrument panel radio grille designed for Cadillac cars won honorable mention in the Industrial group. Tenite was used for this unit. The

grille was styled by the General Motors Corp. and molded by the Norton Laboratories, Inc., Lockport, N. Y.

Third award in the Industrial Group went to the Studebaker Motor Corp. for a molded Celeron spoke gear designed and manufactured by the Continental Diamond Fibre Co., Newark, Del.

Celeron is characterized by high strength, light weight, dielectric strength, good appearance, low cost, and resistance to water, oil, and chemicals. It is said that by reducing the area and changing the shape of the vibrating components of this gear, it has been possible to eliminate resonance and reduce noise volume by 60 per cent.

A clutch body ring of Textolite won honorable mention for the Brown & Sharpe Mfg. Co., Providence, R. I. It was molded by the General Electric Co. of Pittsfield, Mass.

Economy of manufacture through the use of plastics was considered an advantage of this design. It is necessary to turn only the inner section of the ring to fit on the clutch body, and then turn the outside taper to fit the clutch rings in the friction pulleys. In addition, this particular grade of Textolite has a higher ratio of friction than rubber, and other materials formerly used.

Alloy for Metal Cutting Tools

Development of a new cobalt-chromium-tungsten alloy for metal cutting tools has been announced by the Haynes Stellite Co., Kokomo, Ind. Designated as Haynes Stellite-2400, the new alloy is offered in the forms of standard square and rectangular tool bits, welded tip tools and milling cutter blades. In addition, a variety of special small tools, including reamers, counterbores, forming tools, solid milling cutters, special milling cutters and special boring blades can be manufactured.

This patented alloy is being used for machining gear blanks, where the operation involves a surface speed of 200 ft. per min., a feed of 0.064 in. per revolution, and a depth of cut of 1/4 in.

Another application reported is the use of Haynes Stellite-2400 for a cylinder boring job in a large automobile plant. The time for rough boring is 43 sec. Six cutting blades are used in each boring head. Speeds and feeds are: surface speed, 78 ft. per min.; feed, 8.5 in. per min.; load per tooth, 0.0124 in.

The clutch side of cast iron flywheels
(Turn to page 760, please)

WHITE MOTOR CO. of Cleveland has brought out a new series of 12-cylinder, under-floor bus engines of which we are able to show photographs and detail drawings herewith. While embodying the same basic principles as the horizontal engine brought out by the company some five years ago, the new engine differs widely from it in detail design. One of the principal differences is that whereas the former engine had two cylinder blocks bolted to an aluminum crankcase, in the new design all twelve cylinders and the crankcase are a single casting.

The Engineering Department of the White Company was convinced that the twelve-cylinder idea was sound but that in order to offset the increased frictional losses as compared with a six-cylinder, it would be necessary to use a higher compression ratio and to operate at higher speeds, without, however, reducing the service life of the engine.

In the design of the new engines the aims therefore were to make it possible to operate safely and smoothly at high engine speeds, to achieve a high degree of flexibility combined with high specific torque and output, and to limit the service adjustments to a minimum, yet make all adjustments readily accessible. These engines are supplied without governor unless the customer specially requests it, as it is felt that they can safely withstand high speeds.

From one point of view the engine

was designed around the Wilcox-Rich hydraulic valve tappet, which was adopted by the White engineers because of its three well-known advantages: Silent operation of the valve mechanism, absence of adjustments, and increased valve life. The increased valve life is due to the fact that the valve is positively on its seat for a greater proportion of the cycle. The elimination of the valve adjustment made possible the use of a "wet" oil sump, with a positive means of oil gaging, a feature

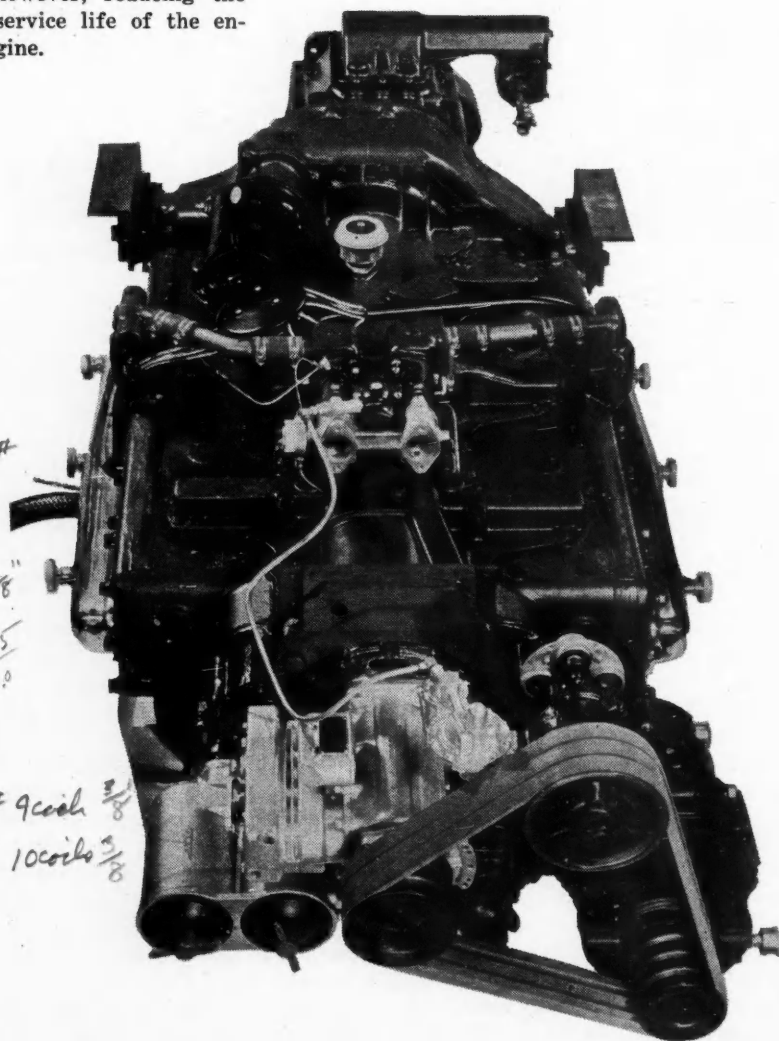
White Redesigns 1

that is greatly appreciated by operators.

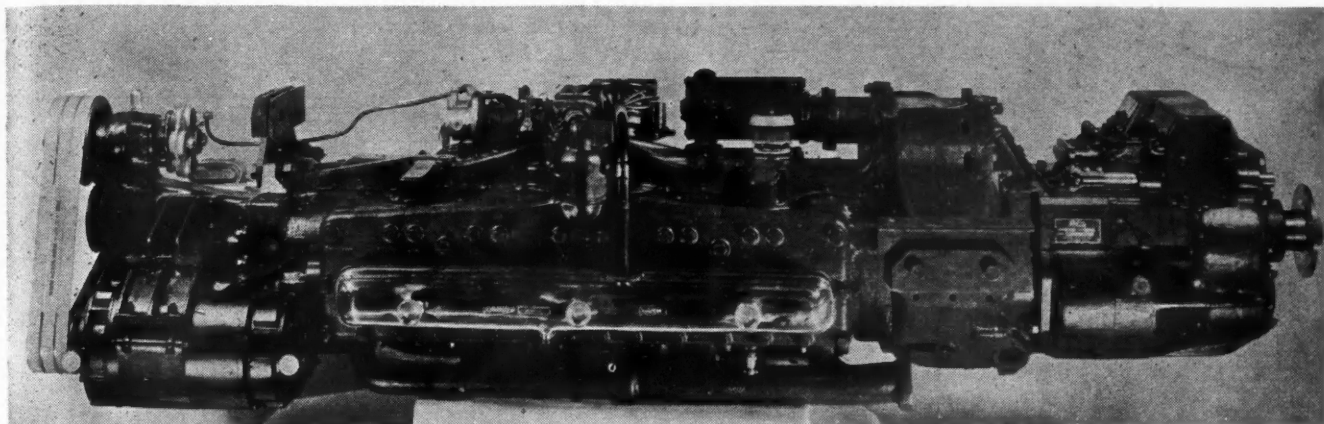
The new White twelve-cylinder horizontal opposed engine is made in three sizes, with bores and strokes of $3\frac{3}{4}$ by $3\frac{3}{4}$ in., $3\frac{3}{4}$ by $4\frac{1}{4}$ in. and $4\frac{1}{4}$ by $4\frac{1}{4}$ in., the corresponding piston displacements being 530, 601, and 681 cu. in. All three engines are interchangeable in the coach, and parts are designed to be interchangeable to the highest degree.

With the aid of the drawings reproduced herewith, it is possible to study the design in detail. It will be noted that the exhaust ports have a rather unorthodox shape, intended to permit better water circulation around the valve seat and stem, but principally to assure concentricity between the hole of the valve-stem guide and the valve seat at all operating temperatures. Valve temperatures, moreover, are kept down by the provision of longitudinal water-distributing tubes, which discharge cool water adjacent to the seats

Turn to page 750 for the description and to the next three pages for detail drawings.

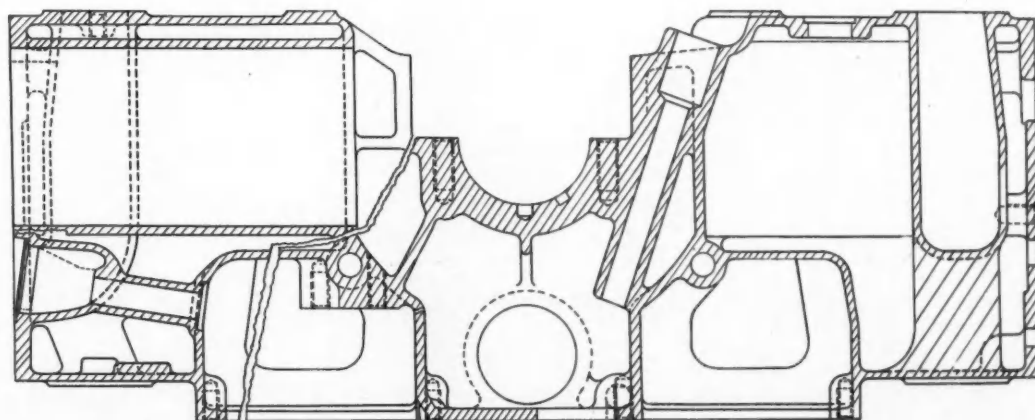
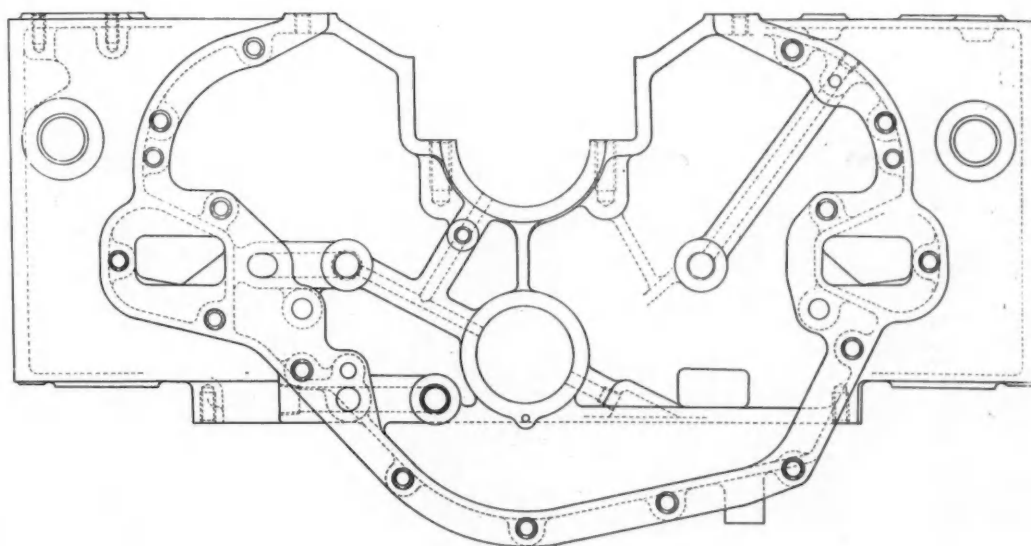


Perspective view of twelve-cylinder powerplant, with oil filters, air compressor and generator in foreground.



Side view of powerplant with accessories at left and transmission on right

12-Cylinder Under-Floor Bus Engine

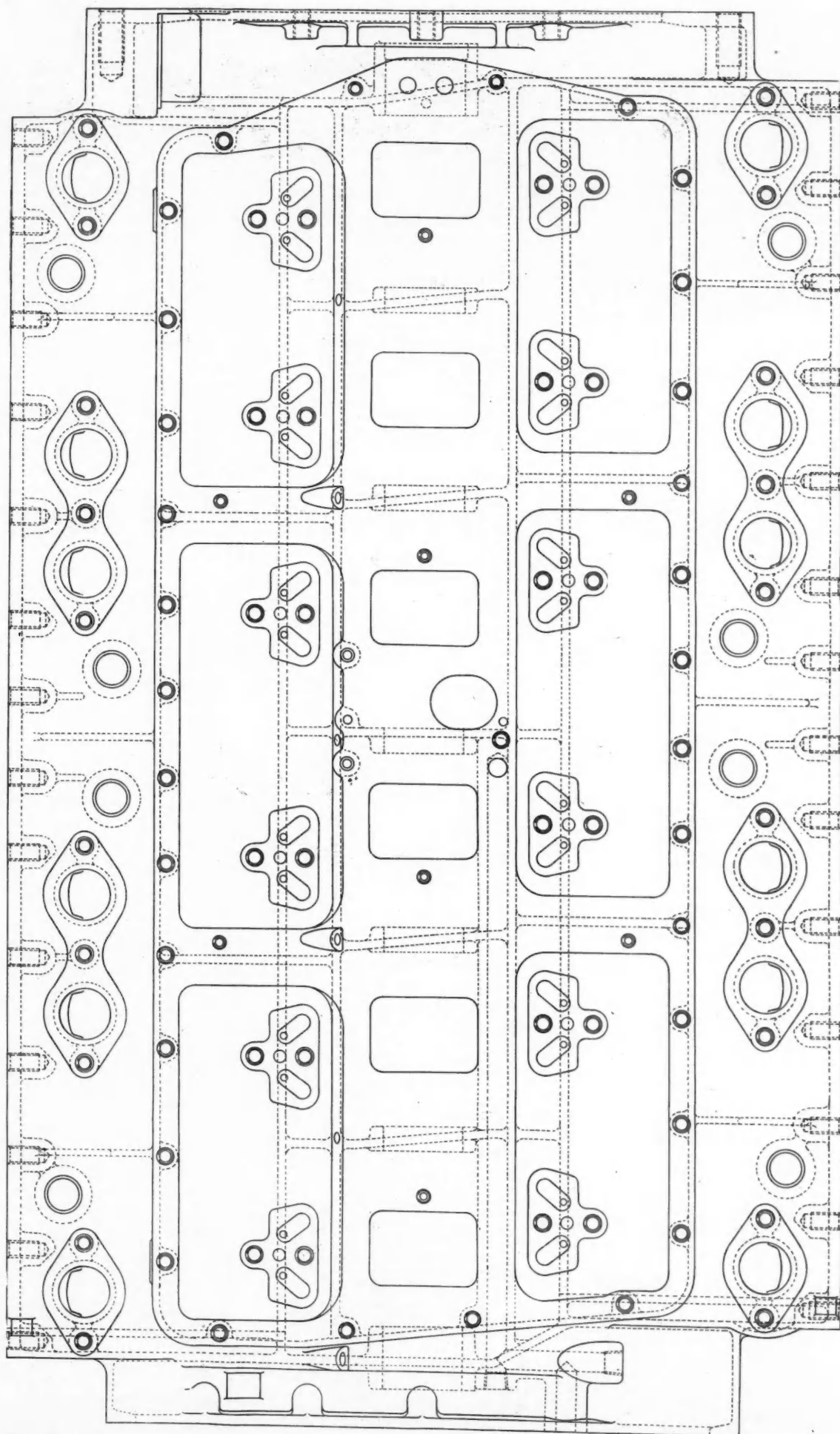


Front elevation and
transverse section of
engine block

Automotive Industries

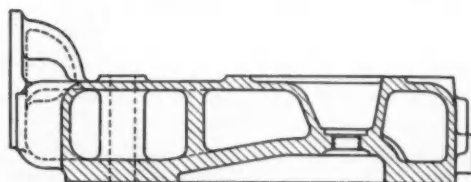
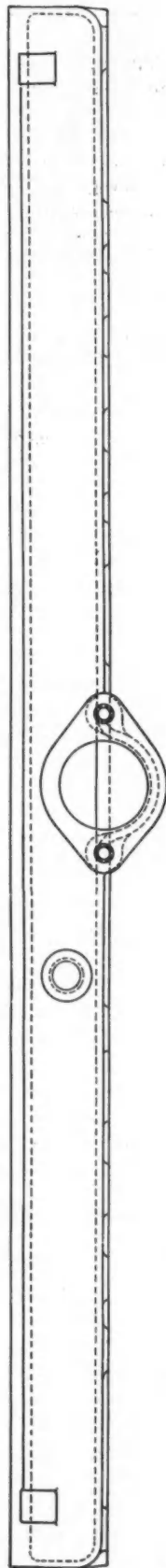
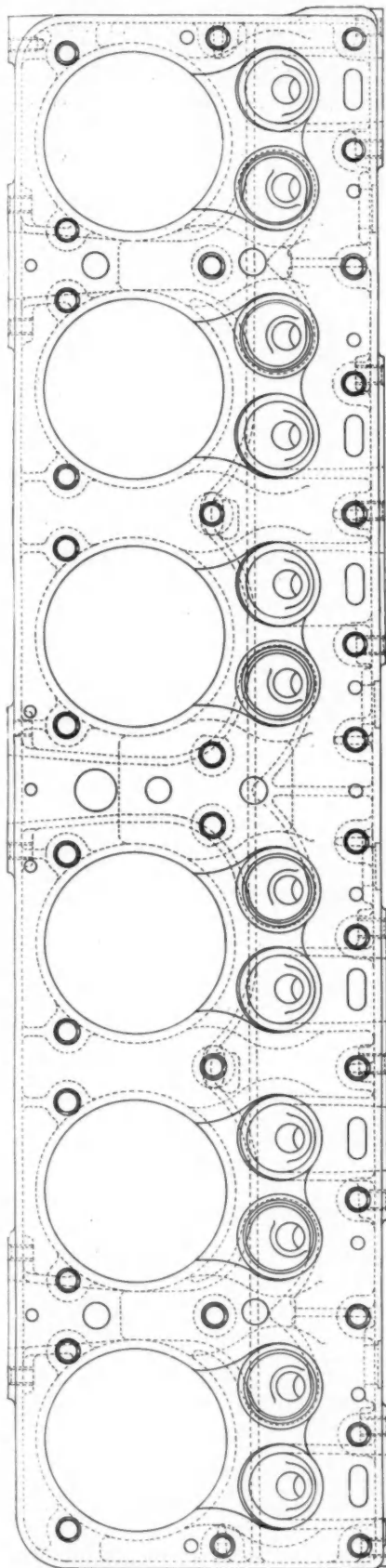
November 20, 1937

Drawings of Engine Block and Cylinder Head of White Under-Floor Bus Engine

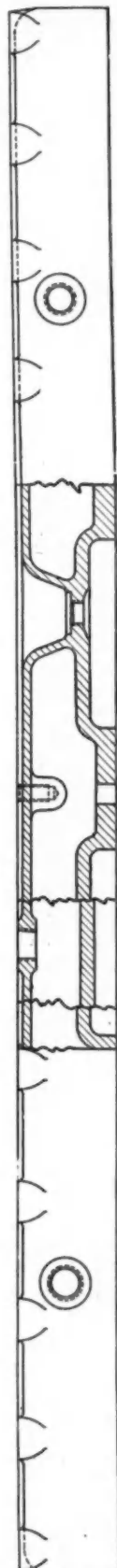
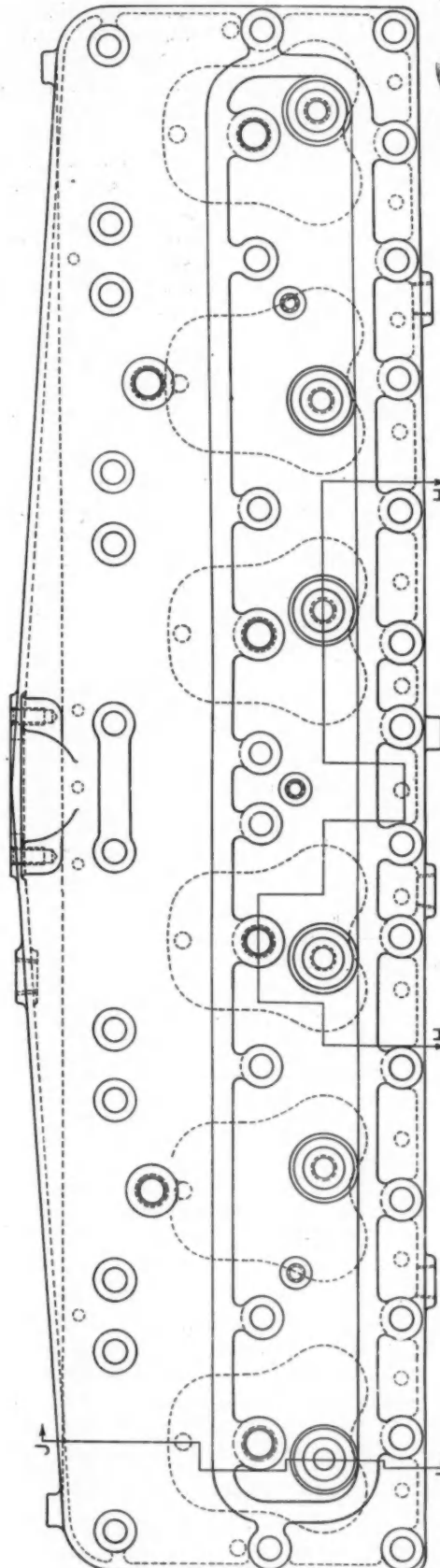


Bottom view of engine block

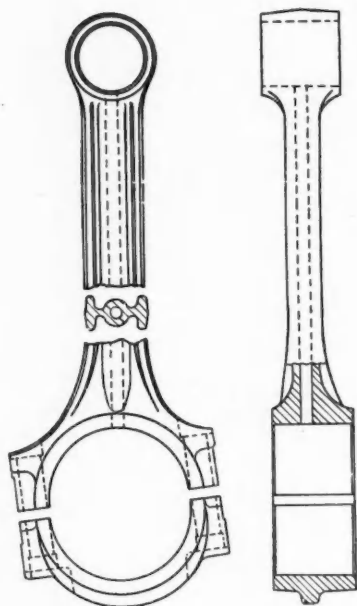
Bottom view of engine block



SECTION J-J



SECTION H-H



Connecting Rod

and ports. To assure equal rates of water delivery to both cylinder banks, a twin water-pump impeller is used.

In order to keep down the initial oil consumption, as well as cylinder-barrel wear at all stages of the engine's life, it is necessary to prevent cylinder distortion due to both mechanical and thermal causes. It is claimed that the cylinder-head cap-screw boss anchorages and the shape of the cylinder barrels at their outer end are such that distortion of the cylinder barrels and of the valve seats while tightening up the cylinder heads is prevented. Thermal distortion is guarded against by

the means provided for circulating cool water around the valve pockets.

Pistons are of the Ray-Day "steel-bound" type and are provided with a Type 200 1/8-in. outer ring, a Type 70 5/32-in. second ring, and a Type 85 3/16-in. narrow-channel oil ring, all of Perfect Circle manufacture. The compression rings are of the M alloy, which shows good wear characteristics on hard liners, and are provided with the "ferrox" non-scuffing finish. The engine block is provided with shrunk-in liners of alloy cast iron showing a hardness of approximately 450 Brinell. It is stated in this connection that even in the largest engine the rate of blowby is so small that it is impossible to measure it with the conventional meter.

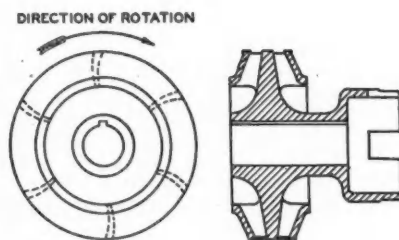
Inlet ports were specially designed to facilitate flow. At the valve seat a venturi effect is produced to increase the orifice co-efficient between the valve and its seat. Also, the valve passage, instead of having a sharp turn, is designed with a large radius, and this, of course, improves the volumetric efficiency. That it does not adversely affect the distribution is indicated by the fact that the engine will run steadily and indefinitely under full throttle at 250 r.p.m., according to the makers.

The intake manifold is of the Swan type and is designed to take a special Zenith duplex horizontal carburetor. Its design, as well as the adoption of the horizontal carburetor, was influenced by height limitations. The manifold is water-jacketed, and warming up and temperature control of the engine are facilitated by two by-pass thermostats, one in each cylinder head, these shunting the flow of cooling water

around the radiator until the cylinder barrel has attained the proper working temperature. Also included in the cooling-water circuit is a Harrison oil-temperature-control unit, which keeps the temperature of the oil in the bearings close to the temperature of the water.

Among the drawings reproduced herewith is one of the cylinder head. It will be seen to be of substantially conventional design, but the vertical position of the heads is said to improve the water flow.

Connecting rods also are of conventional design, but great care was exercised to provide unusual stiffness at the bolt-head sections and in the cap. The water pump is of the packless type, gear driven, and with twin impeller.



Dual impeller of water pump

A vibration damper of the H. A. King rubber type is provided.

Dual oil filters are used and are base-mounted. There are no oil pipes in the entire lubrication system, even the air compressor being lubricated through an oil passage in the main crankshaft.

Magnitude of Horse-Power Corrections

THERE seems to be some apprehension in the industry regarding the possible magnitude of the correction factors which are applied to observed horse powers of internal combustion engines to reduce them to standard atmospheric conditions, and we have seen 14 and 16 per cent mentioned as the proportion which might thus be added to the measured horse power. To get an idea of what the extreme values of the correction factor might be we obtained from the Philadelphia Weather Bureau the maximum and minimum barometric pressures ever observed in this city. These are 31 in. and 28.67 in. of mercury column. The standard atmospheric pressure is 29.92 in. of mercury column. Correction is

made also for temperature, and the standard atmospheric temperature is 60 deg. Fahr. or 520 deg. abs. The highest temperature that we are likely to encounter in a testing laboratory is about 100 deg. Fahr. As the correction factor is equal to the ratio of the standard to the observed pressure, it is equal to

$$29.92/31.00=0.965 \text{ for an atmospheric pressure of 31 in.}$$

and to

$$29.92/28.67=1.0435 \text{ for a barometric pressure of 28.67 in.}$$

In other words, if the barometric pressure is equal to the extreme maximum ever observed in this locality (Philadelphia), the observed reading must

be reduced 3.5 per cent to get the corrected value, while if it is equal to the minimum ever observed, the observed horse power must be increased by 4.35 per cent to get the corrected value.

The correction factor is equal to the square root of the ratio of the observed absolute temperature to the standard absolute temperature, and for 100 deg. Fahr. it therefore is

$$\sqrt{\frac{560}{520}} = 1.038,$$

so that for the maximum temperature which is likely to obtain in the testing laboratory the temperature correction factor adds only 3.8 per cent to the observed horse power.—P.M.H.

Just Among Ourselves

Newark Truck Show In New York?

ON Saturday, Nov. 13, the doors closed on the fourth truck show to be held at Newark, N. J., under the auspices of the New Jersey Motor Truck Association, the Metropolitan Section of the S.A.E. and the Newark Chamber of Commerce. In its brief history, this particular show has amply demonstrated its right to exist and flourish.

So successful was this year's show, and the S.A.E. technical sessions which ran concurrently with it, that a considerable and articulate demand arose to hold the show in New York next year, during the same week as the National Automobile Show. Several of the manufacturing exhibitors are already committed to such a plan, and the preliminaries are going ahead immediately. The show appeals particularly to fleet operators and we rather like the idea of a set up which would give them an opportunity to look at passenger cars and trucks during the same week.

Worth Having— Worth Paying For

LAST week one of our proofreaders nodded while reading a notice referring to a new patent consultation service offered by Athel F. Denham in Detroit. Mr. Denham's services are naturally being offered on a *fee* basis. But as the notice appeared, they were free. We know from experience that Mr. Denham's services are too valuable to be given away in any such big-hearted gesture. Our real regret for the

error is selfishly tempered by the fact that he complains of being deluged with requests for free service. Someone must be reading the magazine, and that's always gratifying to the editors.

Checking Up On the Curricula

ABOUT two years ago, seven of the national engineering societies joined in creating the Engineers' Council for Professional Development. The general objective of the Council is to enhance the status of the engineering profession.

One of its most important subsidiary activities has been visitations by committee to engineering schools of collegiate or university status for the purpose of examining their curricula. The Council has now published a report in which are listed as accredited, those schools whose engineering curricula, quantitatively and qualitatively, were able to meet the exacting standards of the Council.

Now, for the first time, those industries which draw largely on the engineering profession, have a competent, unified guide for assistance in choosing schools from which engineers are turned out, with, at least, the presumption of good academic training.

Copies of the list in question are available from the Information Committee of the Council, at 29 West 39th St., New York City. Among other things, it may interest you to find out whether that "snap" course at dear old *alma mater* was recognized as such by the Council, and left in the outer darkness.—H. H.

Fuel Research

Committee of the American Petroleum Institute discuss new methods and tests in its progress report.

A PROGRESS report on the experimental work of the Cooperative Fuel Research Committee was made at the Chicago meeting of the American Petroleum Institute by A. E. Becker. It dealt with the laboratory section of the study of the knock-rating-correlation problem, the plan being to use the results obtained in this section and those obtained in road tests as the basis of further study aimed at the development of better correlation between road and laboratory ratings.

The work dealt with in the progress report covered:

1. Standardization of knock intensity for the various conditions of test. To facilitate comparisons of results, it was decided to make all tests at a knock-intensity level comparable to that of the motor method.

2. The relationship between spark advance and power, and between spark advance and knock, throughout the compression-ratio range used in making octane ratings. This was done at several speeds and two mixture temperatures.

3. The effect of the following variables on the ratings of a selected list of the winter fuels: Speeds of 600, 900 and 1200 r.p.m.; mixture temperatures of 300, 200 and 150 degs. Fahr., and constant spark advances of 26, 17 and 10 degs. Twenty organizations participated in the experimental work.

It was found that for a given fuel, as the compression ratio is lowered, the spark setting for maximum power increases and that the spark advance for maximum knock does not coincide with that for maximum power. The divergence between the two increases with an increase in the octane number of the fuel used. The curves for spark advance with the automatic control now in use on the CFR engine and for maximum knock cross at 5.3 compression

ratio, indicating that best reproducibility should be obtained in this range.

Conclusions drawn from the work to date are that correlation between road and laboratory values is not a simple problem. While it is recognized that there are other important variables besides those studied that influence the rating of a fuel, it is believed that the work already done permits the finding of a laboratory procedure that will be a material improvement on the present method of testing.

T. A. Boyd, chairman, made a progress report for the Cooperative Fuel Research Committee dealing with the road-test portion of the study of the knock-rating correlation problem.

S. D. Heron of the Ethyl Gasoline Corp., in a paper on "Aircraft Operation with Fuels of 100 Octane Number and Higher," said the refiner is at times inclined to regard the demands for products which are increasingly difficult to produce and steadily more costly, as unjustifiable whims of the aircraft industry. However, the developments of the last ten years, which have turned commercial aviation from a struggling infant into a fairly mature adult, are due in no small measure to the improvement in petroleum products, and the use of 70-octane fuel in most modern multi-engine transport aircraft would preclude the carrying of any payload. Refiners who think that the present trend of octane numbers is evidence of unsound development methods on the part of the aircraft industry would seem to be due for a rude awakening.

Cost per pound-mile of disposable or payload is the real criterion of operating expense, and this may well bear no relation to cost per gallon when considering fuels of different octane numbers.

It is to be expected that, following

the general use of 100-octane fuels, investigation will be concentrated on the improvements available as a result of still higher anti-knock values. Isoparaffins of higher anti-knock value than isooctane are known. One of these at least appears to be in all respects a desirable aircraft fuel, and to be not impossible of commercial synthesis.

The anti-knock requirements of automobiles decrease as the altitude increases, according to Neil MacCull, K. L. Hollister, and Roy C. Crone, all of the Texas Co., who presented a report on a research on this subject. For average cars the rate of decrease varies from about 3 octane units per 1000 ft. elevation from sea level to about 7.5 units at 12,000 ft.

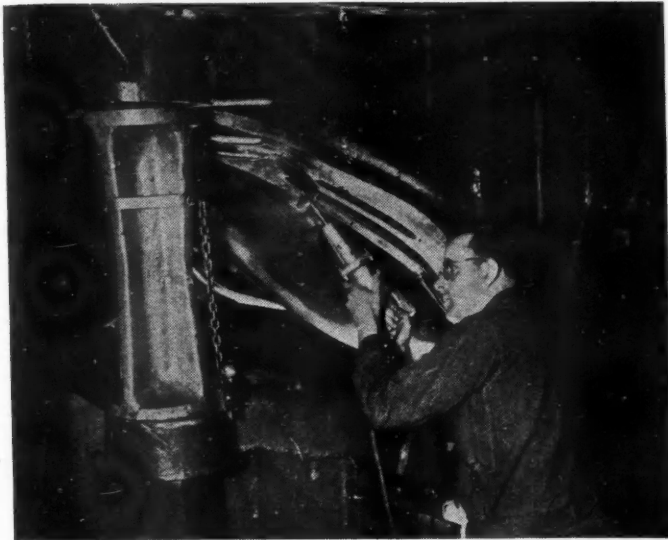
Over the large area of the Western Plains, where the altitude is over 4000 ft., average cars can use gasolines of at least 10 octane units lower value than at sea level. None of the cars tested required over 63 octane at this altitude, although some required up to 78 at sea level.

The mixture supplied by the carburetors of average cars becomes excessively rich at high altitudes. Use of smaller carburetor jets noticeably improves the acceleration under these conditions. They also increase the anti-knock requirement of the car a few units but, even so, the requirement is far below the anti-knock value of commercial gasolines.

T. W. Legatski and R. R. Couch of the Phillips Petroleum Co., Bartlesville, Okla., discussed fuel systems of 1937 cars. Both authors are connected with the road test program conducted jointly by the Western Petroleum Refiners Association and the Natural Gasoline Association of America. Inadequate fuel systems, they pointed out, exclude from consideration large quantities of raw materials, cause operating difficulties such as vapor lock, result in loss of vaporized gasoline at various points of the system, and also cause a quality depreciation by decreasing the anti-knock value and the ease of starting.

Because the fuel systems of the various makes and models of cars are far from being equal in their ability to handle fuels without operating troubles and without excessive losses, fuel manufacturers have for years been constrained to observe specifications which would result in substantially trouble-free operation in the poorest systems. Entirely apart from the re-

(Turn to page 757, please)



When the plug or jack shown in the left of the illustration was lifted from its shelf it pulled out the plug seen hanging from it thus disconnecting the electrical power of the press. The safety plug is made of Dow metal and is used when repairs to a die or other work within the jaws of the press are necessary. This device is a safety measure in vogue at the Chevrolet plant

Production Lines

Buick was wrestling with the die try-outs for its big front fender which had an elongation approaching 40 per cent at one point, at least. We learned the other day that one of the new front fenders on another make took a stretch of 48 per cent at one section. However, some of that had to be taken out in production. Elongations around 40 per cent are nothing short of the phenomenal when you consider how sheet steel has to be produced at the mills. Even at that, the limit has been approached and certain car builders find it necessary to use special, selected deep drawing stock.

Saves Time

A small but handy volume packed full of meat for engineers is a new book, "How to Make Alignment Charts," by Merrill G. Van Voorhis. It's intended primarily for engineers and designers, giving the solution of engineering and other types of formulas by means of nomographic charts. The treatment is of a practical nature, stressing simple graphical methods for constructing the nomograms, supplemented where possible with mathematical solutions. In all, the book highlights 41 different types of formulas which are listed in a separate table so as to permit a matching against a specific problem. A brief outline of theory is given in the Appendix. The book contains 114 pages of text with numerous tables and 78 graphs. Published by McGraw-Hill Book Co., at \$2.50.

Silent Valves

Ever since the adoption of the Wilcox-Rich automatic hydraulic valve lifters by Cadillac following Pierce-Arrow's successful service history, we have speculated upon the virtues of the principle as adapted to heavy-duty industrial engines. A check-up only a few days ago reveals the fact that W-R has made the grade most handsomely. For 1938 they are producing nine different valve lifters for seven different companies of whom three are industrial engine producers. For industrial engines, the automatic valve lifter is sold

purely on its merits in creating improved performance. One of the new cars for '38 will sport the W-R valve lifter as an important element in the design of the engine.

Sky Hooks

Hooks—conveyor hooks—are the nightmare of the plant engineering staff when retooling time rolls along. At least that's what we gather from an inspired and very humanized story in a recent issue of the *Chrysler Motors Magazine*. To the hook expert, the conveyor lines are bent on carrying everything from storage batteries to the kitchen stove. Plymouth boasts almost 20 miles of conveyor lines fitted with something over 20,000 hooks. They mention a very typical if simple hook example—this one carries the hood sections to the spray booths. It takes two sides, two top panels, and the central panel. All the pieces must face the painter; must be held rigidly in position; must not rub against one another. It's really quite simple when you know how.

It Stretches

Although mechanical changes are few for the new season, there is much more than the usual flurry in steel. We refer to the problems involved in stretching sheet steel into the huge and beautifully formed front and rear fenders and certain of the alligator hood tops. A year ago this season,

Diesel Progress

Incidentally, Kettering scored another and bright epigram—you can add it to your collection—concerning the progress of the Diesel idea. He has it in three stages. First it was introduced to compete with steam power and it had to be built as much like a steam engine as possible. That lasted about 20 years. Came the second stage when the Diesel elected to compete with gasoline power. So for years it had to be as like a gasoline engine as possible. That brings us up to now. From now on, it's going to be a Diesel engine—a true compression-ignition engine, if Ket can help it—so far as General Motors Diesel activity is concerned. We like this happy analogy and we think that the modern Diesel engines now available for automotive use fit into the scheme of progress most admirably.

Standard Practice

F. O. Hoagland, master mechanic of Pratt & Whitney, has an interesting discussion on the value of standards in machine shop practice, in a recent issue of *Industrial Standardization*. Factory executives, especially of the smaller plants, should profit by reading the article. The role of the "standards engineer" is of greatest importance. Do you have one in your plant? He can do a world of good and really save some time and money in any production department.

—J. G.

Transportation and Maintenance

Three Shop Systems

Keeping Records

History as a Guide

THE S.A.E. Regional Transportation and Maintenance meeting held at Newark on Nov. 9-10 was attended by unexpected numbers and the papers presented were received with interest.

An account of the meeting appeared on page 702 of Nov. 13 issue of *AUTOMOTIVE INDUSTRIES*. Following are abstracts of some of the papers that were presented.

Chris Bockius and John Bassett, of Manhattan-Raybestos, Inc., discussed the various troubles that brakes give rise to. They pointed out that streamlining features, such as rear-wheel cover plates, have materially increased brake-operating temperatures, and insufficient space between the brake drum and the wheel rim has a similar effect. Excessive operating temperatures are the greatest cause of brake trouble. They cause heat checks to form at the surface of cast-iron drums, as a result of the very steep temperature gradient in the metal near the friction surface. Repeated heating and cooling cause these checks to gradually develop into well-defined cracks, and the sharp edges of these cracks wear the friction material away rapidly.

Soft spots in the brake drum are caused by heating the drum to between 1075 and 1375 deg. Fahr.; while hard spots are caused by heating it above the last-mentioned temperature and then allowing it to cool rapidly. A Brinell hardness of 512 may be thus produced in spots, and as the normal hardness is less than 250 Brinell, the surface of the drum will then wear very unevenly.

Asbestos fiber, the principal constituent of most brake linings, starts to break down at about 700 deg. F. and is completely disintegrated at about 950 deg. Fahr. At this temperature it has completely lost its original crystalline structure, and all that remains is a fine dust-like material. Organic binders used in brake lining materials differ widely in their heat-resisting properties; some are adversely affected at as low a temperature as 350 deg.

Fahr. and the most heat-resistant binders do not stand up at much above 700 deg. However, when highly compressed, the friction material has quite a high resistance to heat. This is due to its low heat conductivity, which prevents the heat from penetrating deeply. Thus the surface may be broken down by high temperatures, but the underlying portion retains its original composition.

"Fading" of brakes is caused by a decrease in the friction coefficient due to softening or breaking down of the binder.

If, after a certain period of service, brakes require greater operating pressure to obtain the original performance, they are said to have "hardened." Modern friction materials are relatively free from the tendency to "harden," except at excessive temperatures.

Rubber parts must not be exposed to excessive temperatures, as at 500 deg. Fahr. the material loses all of its original characteristics, and rubber parts of brakes, or parts located near the brakes, must therefore be properly protected against such temperatures. A wheel will sometimes get so hot that the inner tube is vulcanized to the rim, in which case its life is greatly reduced.

J. H. Middlekamp of the Brooklyn Bus Corp., talking on "Prevention of Recurring Failures," said there are

three different maintenance systems in use by operating companies.

In the first the vehicle is treated as a whole and periodically brought into the shop for partial and complete overhauls, on a time, mileage, or fuel-consumption basis. From the shop standpoint this is ideal, because it provides a uniform flow of work and permits of a greater specialization of labor. However, this system is economical and dependable only when vehicles are operated consistently, as in railroad service.

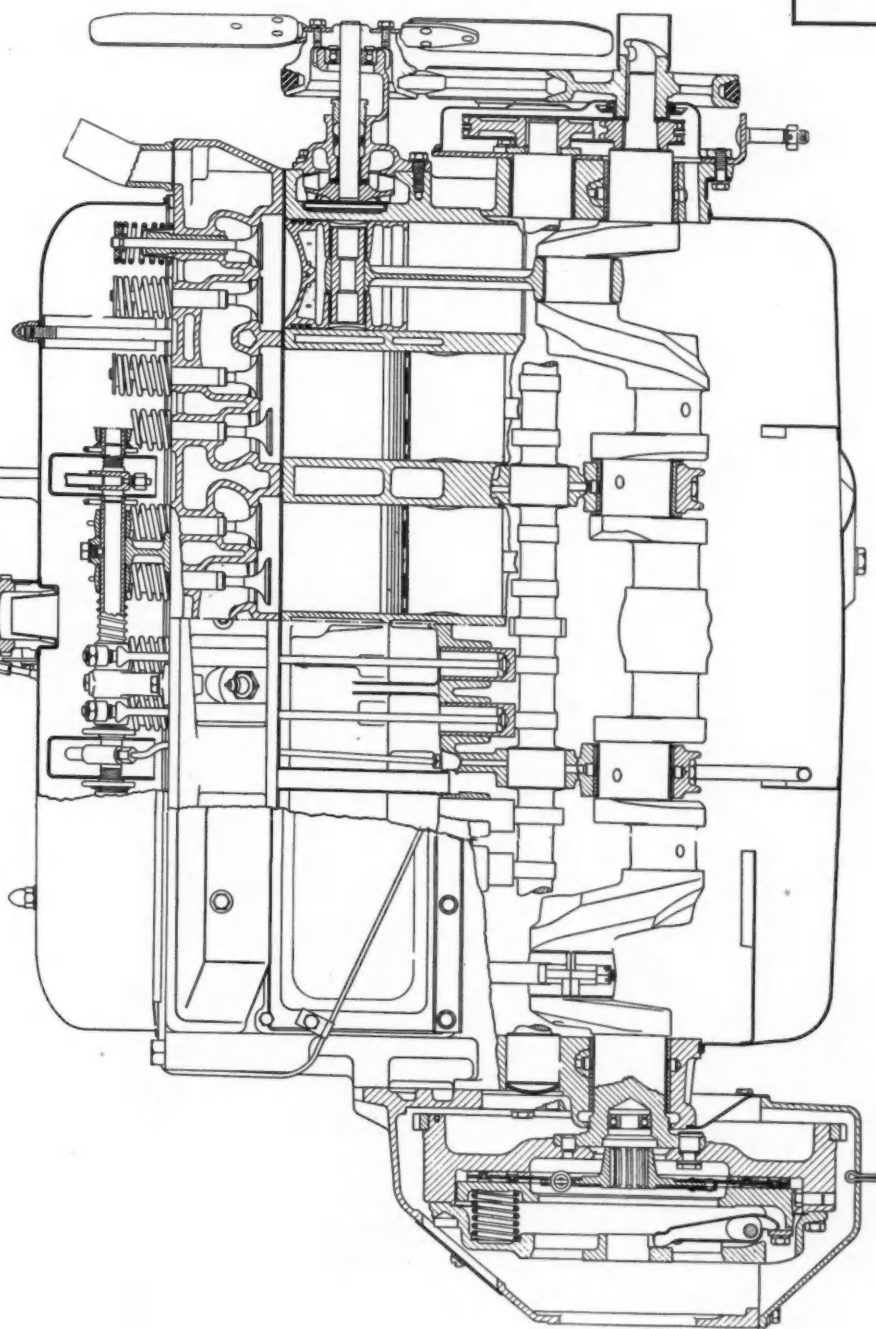
The second system provides for the replacement of each major unit after definite time, mileage, or fuel-consumption intervals. It is orderly and economical if the wear of the parts is reasonably consistent. It is more flexible than the complete-overhaul system, but fails if similar units in a group wear very unevenly for any reason.

The third system provides for the replacement of each major unit in accordance with the results of an actual check each time the vehicle is in the shop for a major routine inspection. Changes of components are made immediately if the inspection shows them to be necessary—on the inspection line by a stand-by crew. In this way complete flexibility is provided, and variable life of similar units is expected and prepared for. A drawback of this last system is that it is likely to overload the shop at times, unless the supervisory staff is very alert.

Properly kept records are essential to any maintenance system, as they furnish symptoms of trouble that are developing. Such a system must provide a perpetual history of the vehicle, and the records that are filed must be those written by the mechanic who did the work. A card should be made out for each scheduled or unscheduled job, with a separately cross-indexed unit record. Mr. Middlekamp said his experience with the card record system had convinced him that it was the most important single item in the prevention of automotive-part failures.

(Turn to page 758, please)

Bedford Light-Truck Engine



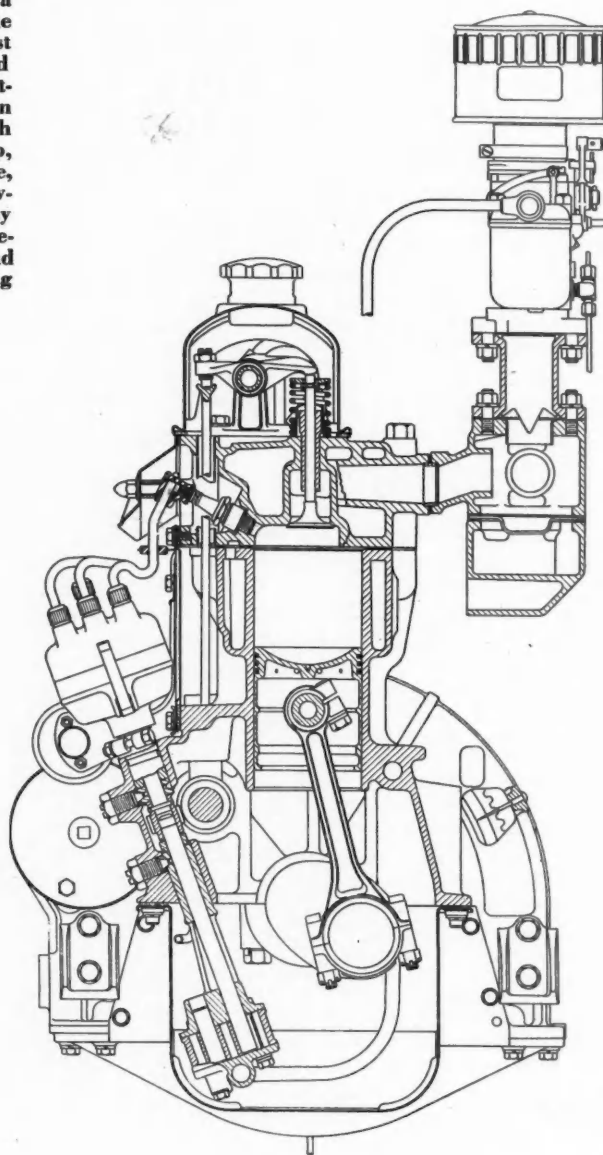
This six-cylinder engine has a bore of 3-5/16 and a stroke of 3 3/4 in. and its displacement therefore is 194 cu. in. It is rated 64 hp. at 2800 r.p.m. The maximum torque of 143 lb.-ft. (corresponding to a b.m.e.p. of 110 lb. per sq. in.) is maintained closely over the speed range 1000-1700 r.p.m. The engine is being manufactured by Vauxhall Motors, Ltd., of Luton, England, and powers its 1 1/2 and 2-ton trucks.

Scale 1: 5.75 ±.

No. 5 of the Second Series of
AUTOMOTIVE INDUSTRIES
Engineering Drawings

Bedford Light-Truck Engine

Features of this engine include a cast-iron block and cylinder head, a four-bearing crankshaft with bearings ranging in diameter from 1-15/16 to 2-3/16 in., crankpins of 2-in. diameter, connecting rods of 7-in. center-to-center length, a four-bearing camshaft supported in a steel-backed babbitt bearing at the front end and directly on the cast iron elsewhere, pushrod-operated silicon-chromium-steel valves, cast-iron pistons with two compression and one oil ring, a downdraft Zenith carburetor with accelerating pump, interconnected throttle and choke, an A.C. fuel pump, and a belt-driven water pump. Lubrication is by pressure to all bearings, the valve-gear and the front-end drive, and jets of oil are thrown off the big ends to the cylinder bores.



FUEL RESEARCH

(Continued from page 752)

strictions which such a situation imposes on fuel manufacturers, the cars which could handle a better fuel are definitely penalized.

What are known as the Pawhuska road tests were conducted jointly by the two organizations mentioned to study existing road-test procedures critically to determine their limitations; to work towards the development of more satisfactory road-test procedures for the determination of permissible vapor pressures, volumetric losses, and quality losses; and to obtain as much information as possible on the fuel-system characteristics of representative 1937 cars.

The report was a preliminary one, and most of the conclusions drawn related to the test methods and their possible improvements. It is stated, however, that the over-all losses from representative fuel systems, when using the gasoline normally sold for average maximum atmospheric temperatures, will range from approximately 4 per cent to some higher value, depending upon the type of driving, and that the corresponding over-all loss in knock rating will be at least one octane number.

Polymerization

The polymerization process is one of the most important developments in the petroleum-refining industry. Motor fuel was first produced by straight distillation, and later by cracking. The quantity of gas produced in the cracking process increases with the improvement of the anti-knock quality of the motor-fuel product, and a satisfactory economic disposal of this gas was a real problem. This was solved by the introduction of the polymerization process with the production of a superior motor fuel from the gas. The cracking process depends for its economic utility on the conversion of heavier hydrocarbons to lighter ones of greater value, while the polymerization process is in principle the reverse, viz., the conversion of gaseous hydrocarbons to liquid ones in the form of high anti-knock motor fuel.

The subject of "Motor Fuels from Polymerization" was discussed at the meeting by Gustav Egloff, J. C. Morrell, and Edwin F. Nelson, all of the Universal Products Co. of Chicago. They pointed out that more than 9,000,000 gal. of polymer gasoline might be produced yearly from the hydrocarbon gases in the United States, of which more than 1,000,000,000 gal. might be isooctane fuel of 95 to 100

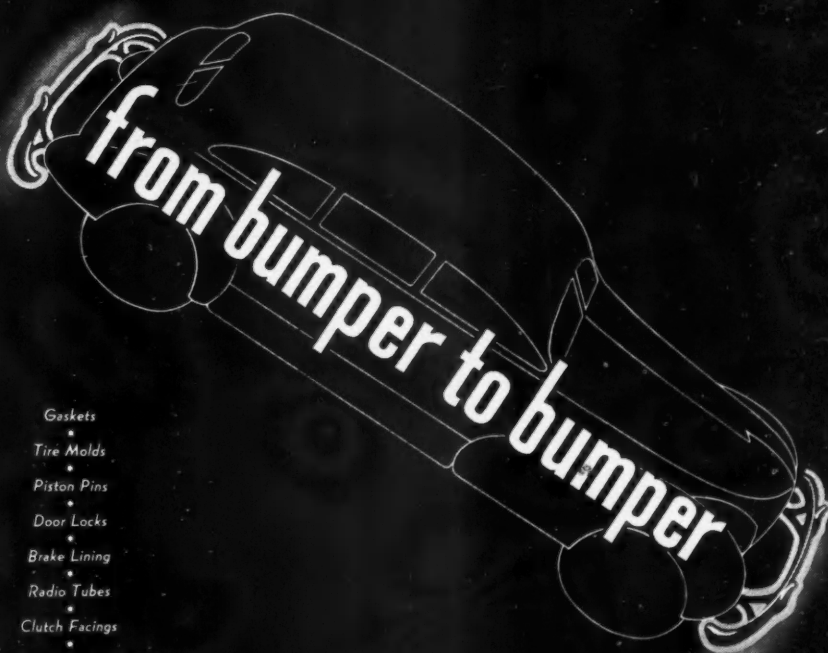
octane rating, valuable for aviation.

Three modifications of the polymerization process were described by the authors: *a*, polymerization of hydrocarbon gases containing propene and butene; *b*, pyrolytic cracking of butanes (and also propane) to produce olefin hydrocarbons followed by catalytic polymerization to produce polymer gasoline; *c*, selective polymerization of

normal and isobutene and hydrogenation of the resulting octenes into isooctanes.

A commercial plant described in the paper processes daily 13,070,000 cu. ft. of cracked gas containing 19.2 per cent of propene-butenes, polymerizing 79.5 per cent of these olefins, and producing 1080 bbl. of true polymer in addition to 974 bbl. of butanes.

The polymerization process for the production of polymer gasoline to improve the octane rating of the refinery output, or as a step in the process of



Gaskets
•
Tire Molds
•
Piston Pins
•
Door Locks
•
Brake Lining
•
Radio Tubes
•
Clutch Facings
•
Headlight Bulbs
•
Cooling Systems
•
Aluminum Piston
Manufacture
•
Distributor Point
Manufacture
•
Battery Terminals
•
Rubber Mountings
•
Springs and Chassis

The column on the left enumerates instances in automotive manufacture wherein "dag" colloidal graphite is used. And along with these, of course, should be included the well-known use as a supplementary lubricant for crankcase and upper cylinder protection. Some of these applications have been developed by the user and others by our own Technical Department. In practically every case, our Technical Staff has lent valuable assistance. They will be glad to co-operate in any problem in which you feel "dag" colloidal graphite may be helpful. Write for descriptive booklet No. 700.

ACHESON COLLOIDS CORPORATION • PORT HURON, MICHIGAN

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DAG COLLOIDAL GRAPHITE IS A 100% AMERICAN MADE MATERIAL

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Please send gratis, story on "dag" Colloidal Graphite.

NAME

ADDRESS

making isooctanes, is now in relatively wide use in the oil industry.

It is generally known that the gasoline we use as motor fuel is composed of a mixture of hydrocarbons of the paraffin, naphthene and aromatic series, and that the crude petroleum from which these gasolines are produced also are mixtures of such hydrocarbon compounds. Just how many hydrocarbons are to be found in crude petroleum will probably never be determined definitely, but the research work on the chemical constitution of petroleum which has been carried on for the American

Petroleum Institute for the last ten years has partly solved the problem with respect to a large part of the gasoline fraction of a Mid-Continent petroleum.

In a report presented at the meeting by Dr. Frederick D. Rossini it was stated that 45 different hydrocarbon compounds are definitely known to be in that part of this petroleum which normally boils at below 180 deg. C. (356 deg. Fahr.). Eight individual compounds constitute about one-half of the entire petroleum normally boiling between 131 and 393 degs. Fahr., and 18

constitute about two-thirds of the fraction mentioned. In the report there is included a table of all of the 45 hydrocarbons found, giving their chemical formulae, name and type, boiling point at atmospheric pressure, purity of best sample isolated, and estimated relative amount by volume.

Hydrocarbons present in a volumetric proportion of more than 0.2 per cent are normal hexane (0.7 per cent), 2-methylhexane (0.3), 2-methylheptane (0.5), normal nonane (1.0) and normal decane (0.8) of the paraffin series; methylcyclopentane (0.3) and methylcyclohexane (0.3) of the naphthenic series, and toluene (0.3) of the aromatic series.

Transportation and Maintenance

(Continued from page 754)

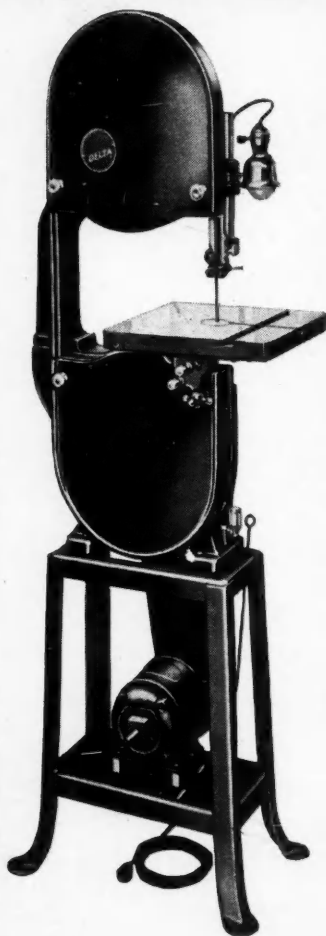
Without this record the third system of maintenance discussed would be unworkable.

W. J. Cumming of the Surface Transportation Corp. in a paper on "Fleet History as a Guide to Maintenance," listed the various causes of interruptions in the schedules of the corporation's bus services during the past six years. Tires were responsible for from 10 to 40 per cent, fare-collection devices for from 5 to 11.4 per cent, fuel lines for from 2.7 to 5.1 per cent; springs, transmissions and air compressors for about 3 per cent; clutches, brakes, batteries and air lines for 2.5 per cent; differentials, fans, belts, carburetors, accelerators and starters, 2 per cent, and doors, engine valves, connecting-rod bearings, distributor units, ignition coils and condensers, 1.5 per cent, and axle shafts, propeller shafts, and water pumps, 1 per cent.

A great deal of trouble was experienced from excessive cylinder wear, but the development of alloy cast irons in recent years now makes available superior dry sleeves, and in one particular case these multiplied the life of cylinder-bores by five.

Emulsification of crankcase oil, which was formerly caused by inability to maintain sufficiently high water-jacket temperatures, has been reduced by the introduction of thermostatically controlled radiator shutters and the use of cotton-bag filters. In the course of service all valves are faced with Stellite. Crankshaft life is increased by "spraying" bearing surfaces with high-carbon steel after first reducing the diameter of the worn journal by 0.060 in. by grinding and shot-blasting and gashing or nicking the surface so as to assure a good anchorage for the sprayed metal. Water pump housings that are badly corroded are sprayed with zinc.

NEW Metal-Cutting 14 inch Band Saw



THE regular 14-inch Delta band saw, fitted with countershaft to reduce the speed, has been used in hundreds of shops for cutting Iron, Steel, Brass, Bronze and Aluminum bars, shapes and sheets in foundries for cutting off gates, in die-casting shops for trimming and sawing castings.

Here is a new and improved back-geared model which is even more ideal for this work. It is the perfect machine for the general machine shop, toolroom or experimental shop, where many different materials must be cut.

It takes the place of a power hacksaw in cutting off bars and shapes; it is used in the toolroom for sawing off tool, die and fixture stock; it will cut uniform strips from sheets; it saves hours of time in cutting templates and similar tools, and will cut almost any material, such as asbestos, mica, vulcanite, fiber, etc. . . . difficult to cut by ordinary means.

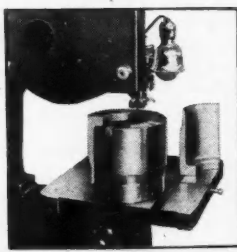
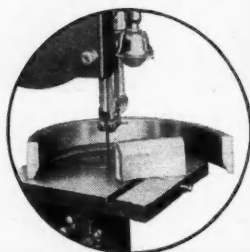
It will "double in wood," too by a simple change of belts, as provision is made for four low metal-cutting speeds and one high speed for wood sawing.

Write for special circular giving full details and specifications.

\$79⁵⁰

14" Back-geared Metal-Cutting Band Saw, complete with guards, 8" arbor pulley for wood and cone pulley for metal. With one 14-teeth metal-cutting blade. Without light attachment, belts, stand, motor or motor pulley. Shipping weight 175 lbs.

One of these draw-die segment rings was impractical to cut on the milling machine because of the diameter of cutter required; the other because the diameter of the ring was too large for the milling machine. Both, however, are cut with ease and speed on the Delta band saw. Try your next "awkward" job on one of these versatile tools.



DELTA
MANUFACTURING CO.

631 East Vienna Ave.
Milwaukee, Wis.

Front and rear axles are inspected regularly at 2500 to 3000 miles, and such parts as drag links, steering arms and steering knuckles, which are highly important from the safety standpoint, are inspected by the Magnaflux method with the object of detecting any hidden cracks.

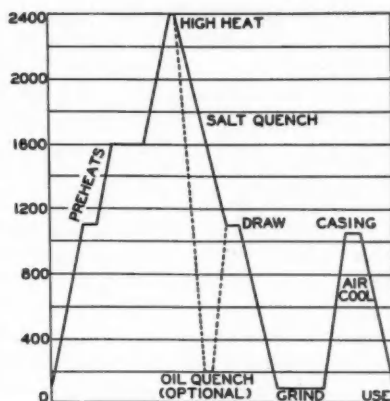
Comparing six-wheel trucks with tractor-semi-trailer combinations, J. G. Moxey, transportation engineer of the Sun Oil Co., asserted that in ordinary highway transportation the six-wheeler has the advantage that it can travel over roads and go into places where it would be impractical to take any other type of machine, particularly a six-wheeler of the double-drive type (which latter feature can be obtained at the cost of very little additional investment). Six-wheel units are usually employed where heavy loads and not very large body capacities are required, that is, as dump trucks, coal trucks, trucks for hauling heavy machinery, etc. Where maximum performance is essential, with great high-gear or low-gear gradeability, in virgin terrain or on unimproved roads, the six-wheeler stands out above all other types.

Two advantages of the tractor are the reduced amount of repair-shop floor space required by it, and its greater accessibility. One of the principal objections urged against the tractor and semi-trailer is its proneness to "jack-knifing," but a recent survey of about 125 fleet owners showed that only 1½ per cent had experienced any difficulty of this kind and 60 per cent said they were not bothered by it at all. Inter-terminal and shuttle service is one field where tractors and semi-trailers apparently stand unchallenged, as a small number of tractors can be used together with a large number of trailers, and where terminal time, that is, the time required to load and unload, is of considerable importance, it is possible to get far better cost figures with the tractor and semi-trailer.

New High-Speed Steel Treatment

A COMPREHENSIVE cycle of high-speed steel treatment by means of salt baths is announced by E. F. Houghton & Co., Philadelphia. The cycle of treatment is illustrated by the accompanying diagram. For the preheat a neutral hardening salt, which will neither carburize nor decarburize, is provided. Liquid Heat No. 2400 with a working range to 2500 deg. Fahr. is recommended as a high-heat salt. Work may be quenched in oil or given a salt-bath quench following the quick high-heat treatment.

After being drawn, the work is

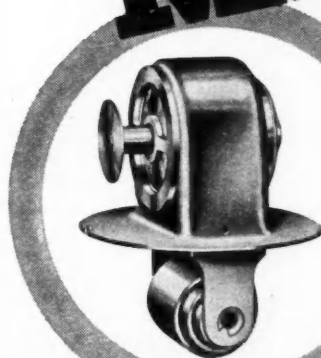


Cycle of heat-treatment for high-speed steel by means of Houghton "Liquid Heat"

ground and a case is superimposed upon it by a further liquid bath, recently perfected, giving an outer case 0.001 to 0.002 in. in depth. It is claimed that this additional treatment gives a hardness of more than 1,000 Brinell and increases the rate of production of high-speed tools by from 25 to 300 per cent.

TOPS *in*

MOTOR TEMPERATURE CONTROL



● The automotive cooling system dissipates heat at a rate largely influenced by the speed of the car—but car speed has no relation to wind and cold weather.

The motor temperature control established by Dole Thermostats enters the picture to maintain a zone of maximum operating efficiency—a performance feature for the car manufacturer's reputation—an economy feature to pass on to the motorist.

Under the Dole engineering staff the production of automotive thermostats and THERMOSTATIC BI-METAL (for many purposes) has reached the proportions of leadership.

Consult with us about your particular requirements.

DOLE

Thermostats

THE DOLE VALVE COMPANY, 1901-41 Carroll Ave., Chicago, Ill.
DETROIT OFFICE: General Motors Building

AUTOMOTIVE MATERIALS

(Continued from page 745)

for another make of automobile is rough and finish faced and bored with Haynes Stellite J-Metal and -2400 tools. Six tool bits are used for rough facing. The three bits facing nearest the outside diameter are Haynes Stellite-2400, and those operating at a lower surface speed, nearer the center, are J-Metal. When the operation is completed, the finishing cut is taken with a scraping tool of J-Metal. Total

actual cutting time for both operations is 1 min. 15 sec. Operating conditions are: r.p.m., 24 (equivalent to a surface speed at the outside diameter of 86 ft. per min.); feed, 0.032 in. per rev.; depth of cut, $\frac{1}{8}$ in.

It is further reported that in an operation of machining stainless steel poppet valve nozzle castings, Haynes Stellite-2400 was adopted in an effort to overcome tool breakage. The ma-

chining operations on the $4\frac{1}{2}$ -in. outside diameter casting include rough and finish turning two diameters, tapering, facing, and boring. Time studies give the following conditions for facing and boring: r.p.m., 61 (equivalent to a surface speed at the outside diameter of 72 ft. per min.); feed, 0.005 in. per rev.; depth of cut, $\frac{1}{8}$ to $\frac{1}{4}$ in. Rough and finish turning are accomplished on a separate machine with approximately the same feed and depth of cut, but the surface speed is higher, being 125 ft. per min. About 30 pieces are turned and tapered between tool grinds.

Haynes Stellite-2400 can be ground either by hand or by machine. In general, any soft grade vitrified grinding wheel, not coarser than 46 nor finer than 60 in grade I or J of the Norton system, or grade M or N of the Carborundum system can be used on Haynes Stellite-2400 with satisfactory results. The peripheral wheel speed should be between 3000 and 4500 ft. per min. The new alloy was developed by Union Carbide and Carbon Research Laboratories, Inc., and Haynes Stellite Co., two units of Union Carbide and Carbon Corp.

HIGHEST AIR CLEANING EFFICIENCY

UNITED HAT TYPE OIL
BATH AIR CLEANER



NEW 1938 UNITED AIR CLEANER GAINS GREATER RECOGNITION — BECAUSE

PROTECTS MOTORS AT WIDER RANGE
OF THROTTLE OPENINGS OR VARIABLE
HORSEPOWER LOADS.



ITS EXTREME LOW RESTRICTION
CAUSES LESS HORSEPOWER LOSS.



ITS PROVED MERITS—PERFORMANCE
AND CONSTRUCTION—MAKE UNITED
PREFERRED BY MANY LEADING CAR
AND TRUCK MANUFACTURERS.

Service departments of manufacturers using UNITED OIL BATH air cleaners repeatedly tell us that our cleaners eliminate air cleaner complaints almost entirely—that piston ring and bearing wear in motors with UNITED protection are reduced to a fraction of wear occurring where impingement type cleaners are used.

Furthermore, UNITED cleaners reduce frequency of valve grinding jobs to a point where many original car owners are no longer familiar with that type of upkeep expense.

Reduce upkeep cost by insisting that engines be protected with UNITED OIL BATH air cleaners. UNITED is standard equipment on nationally known cars, trucks, farm tractors, and industrial power units.

UNITED AIR CLEANER CO.

Division of United Specialties Company

9705 COTTAGE GROVE AVE.

CHICAGO, ILL.

Chrome Plating Rack Insulating Enamel

Enamel for insulating all but the contact points of the racks used in chrome plating has been developed by Maas and Waldstein Co., Newark, N. J.

The chrome rack enamel is said to effectively insulate all parts of the rack that it covers, thereby preventing dissipation of the current. It is applied by dipping the racks (with contact points protected by tape) into the enamel. Three or four coats are required, which can be applied at intervals of about two hours.

After the final application, the coating becomes hard enough for use if forced-dried for two hours at 150 deg. Fahr. or air-dried for 24 hours. The enamel is supplied in two colors, red and black.

Pigment for Baked Lacquers

Titanium dioxide pigment for baked lacquers which will withstand higher temperatures without yellowing was recently brought out by the Krebs Pigment & Color Corp., subsidiary of E. I. duPont de Nemours & Co. Use of this pigment is said to permit reduction in the time required for baking finishes.

The new pigment, trade-named "Ti-Pure CR," is claimed to have sufficient color stability of its own so that sup-

plementary pigments are not required. This simplifies formulation problems, especially where highly reactive vehicles are used which are frequently incompatible with some pigments normally introduced to prevent yellowing.

According to the released information, the pigment shows most resistance to discoloration in alkyd resin vehicles, slightly less color retention in nitrocellulose lacquers and least resistance in phenolic and maleic anhydride type resins. Its color retention is superior to that of the regular grades of titanium dioxide in both air-dried and baked coatings, and it is said to be equal, if not superior to, the regular grades in rate of drying and retention of drying in 4-hour and 16-hour enamels. It also develops less discoloration in plastics.

The pigment is offered in two grades, one of medium oil absorption, the other of low oil absorption.

Neoprene on 1938 Cars

Neoprene, a chloroprene rubber produced by E. I. du Pont de Nemours & Co., has been used on a number of the 1938 automobiles. Among the many applications of the material is its use as a bumper in the front wheel lower spring seat on the new Chrysler models, an application which utilizes both the vibration-dampening and oil-resisting properties of neoprene.

On the '38 Studebaker, the gear shift bumper is neoprene. Dust and oil seals of this material are used on the Graham, Willys, Chevrolet, Pontiac, Cadillac-LaSalle, G. M. Truck, and Chrysler-DeSoto.

The chemical resistance of neoprene makes it desirable for use in those applications where contact is made with anti-freeze solutions, and Ford, Cadillac-LaSalle, Buick, Oldsmobile, Pontiac, Nash, and Hudson-Terraplane are using neoprene for water pump seals, packing, or for radiator cap gaskets.

Carter Vacuum Carburetor

A tapered or stepped metering rod has been used in Carter carburetors for a considerable number of years. In earlier models this metering rod was positively connected to the throttle, so that for any given throttle setting it occupied a definite position in the metering jet, and this determined the rate of fuel delivery for that particular throttle setting.

In the new Vacuum model the position of the metering rod is still under the control of the throttle in nor-

mal operation. With the throttle in any particular position and the engine operating at a steady speed, a pin engages the vacuum-and-metering-rod assembly and holds it in a position which assures the delivery of a maximum-economy mixture for that particular operating condition. If now the throttle is suddenly opened for quick acceleration, the vacuum increases greatly, and an actuating spring under the piston then moves the metering rod so that a smaller step enters the jet and the effective jet area is increased. The rate of fuel flow is then increased, and a rich "power mixture" is obtained,

as required for rapid acceleration. When acceleration ceases the vacuum-and-rod assembly returns to its position against the pin, and the carburetor then delivers an economy mixture for whatever position the throttle may now be in.

It will be seen from the foregoing that the new feature of the Carter is what is generally referred to as an economizer feature. An advantage claimed for it is that it works without lag in supplying a rich mixture for acceleration, there being no auxiliary jets to fill before the effect becomes noticeable.

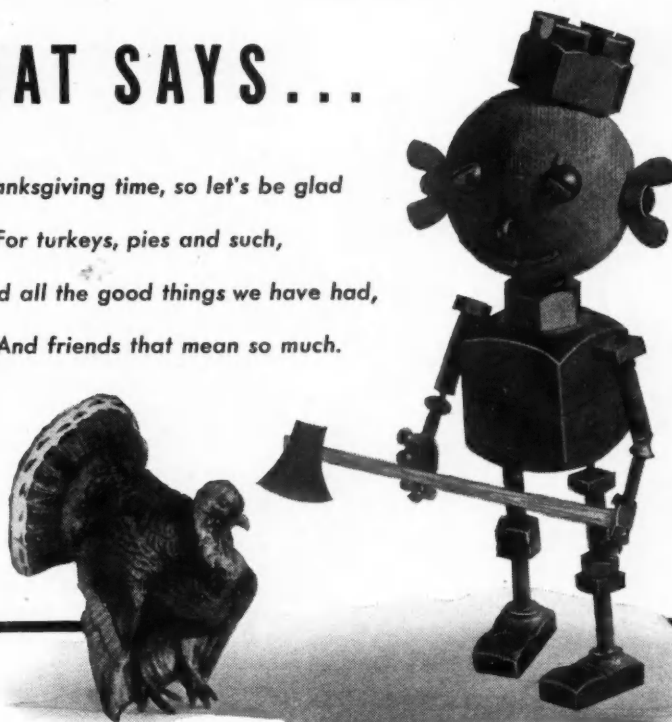
NAT SAYS...

Thanksgiving time, so let's be glad

For turkeys, pies and such,

And all the good things we have had,

And friends that mean so much.



What'll yours be?

White meat and dark, breast, second joint and drumstick, with all the trimmings... just as complete and rounded out as a Thanksgiving dinner, is the line of nuts, bolts and kindred products made by National.

You'll appreciate the advantage of having one dependable source of supply for all these products. We're ready to serve you... what'll it be?

NUTS AND BOLTS
MACHINE SCREWS
CAP AND SET SCREWS

WOOD SCREWS
COTTER PINS
SPOKES AND NIPPLES
STOVE BOLTS

WING NUTS
PIPE PLUGS
RIVETS, TACKS

National
PRODUCTS

THE NATIONAL SCREW & MANUFACTURING CO.
CLEVELAND · OHIO

TOOLS OF TOMORROW

(Continued from page 737)

the bearing face of the Marsden nut is recessed to provide an outer continuous bearing surface, while its opposite end is provided with slots through the flats of the hexagon.

It is applied as a standard nut with standard wrench equipment and when tightened against a solid base is mechanically sprung within the elastic limit of the material from which it is made, no thread deformation taking place; consequently, it is easily removed and replaced.

Licensees and producers of Marsden

nuts are: National Machine Products Co., Detroit; Lamson & Sessions Co., Cleveland, and Russell, Burdsell & Ward Bolt & Nut Co., Port Chester, N. Y.

Broaching Unit

... turns out 400 connecting rods and caps per hour.

Production of 400 connecting rods and caps per hour per machine in the plant of a leading automobile manufac-

turer is reported by the Colonial Broach Co. The machine being used is the continuously operating alternating-cycle dual-ram Colonial broach.

The unit is of the vertical type with an 18-in. stroke and three tons capacity per ram. It broaches the joint faces on rods and caps, the rods being done on one ram, caps on the other.

Operation is completely automatic. While the left hand ram is traveling downward, broaching the cap, the right hand ram moves upward on the return stroke after having broached a rod. During this upstroke, the fixture holding the rod is automatically kicked out sideways and clamps automatically released, permitting removal of the finished rod and insertion of another. Toward the end of this same stroke, the part is automatically clamped and the fixture automatically returned to position for broaching.

The right hand ram then travels downward and the left hand ram upward. The same cycle now occurs for the left hand ram, the fixture being kicked out sideways, the part released by the clamps, a new part clamped in the fixture and the fixture returned to the broaching position.

About 0.010 in. of stock is removed in the operation, with a finished tolerance of 0.0005 in.

Covered Wagon Exports

To facilitate export trade, Covered Wagon Co., Mt. Clemens, Mich., has announced it is now possible to ship trailers in knock-down condition to foreign lands. The knock-down trailers are being crated in one container. The chassis and trailer flooring comprises the base of the crate, the wheels, axle and springs the second layer, followed by the side walls and front and rear walls, and finally the roof. This layout provides a compact arrangement, in minimum space. Trailers for export are shipped as shells only. Interior cabinet work may be added at destination.

CHILTON ROUNDTABLE

(Continued from page 740)

reached making the union the exclusive bargaining agent for salesmen, and providing for a minimum scale of commissions ranging from \$15 to \$35 a car, and a \$25 a week drawing account and no deductions for trade ins. Dealers won a concession in maintaining salesroom hours from 9 a. m. to 9 p. m."

From

COMMERCIAL CAR JOURNAL

"Public utility trucks are almost fantastic in their ability to act as power base and store house for construction crews. Some of the Federal projects such as dams could not have been started without first building a railroad were it not for specialized trucks. Door-to-door deliveries have been speeded up and local freight, protected from weather, arrives earlier."



No doubt about it, improving the balance of rotating parts in an automobile improves comfort. But how can improvements be made in parts or units believed to be commercially perfect, such as Mechanics Universal Joints and Shaft Assemblies? It has not been easy, but it has been done! Mechanics has developed a new slip joint design which reduces weight substantially, facilitates maintenance of accurate alignment, and moves center of mass closer to point of support. The result is improved balance... which improves riding comfort. In addition, the new slip joint has other features of design and construction which provide new

smoothness of operation and long life. Already standard equipment on notably successful cars, Mechanics Shaft Assemblies with the new slip joint deserve careful consideration by all executives concerned with building better automobiles. Investigate.

MECHANICS UNIVERSAL JOINT DIVISION
Borg-Warner Corp. 1301 18th AVE., ROCKFORD, ILLINOIS

